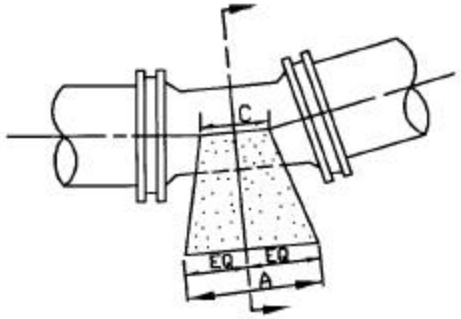
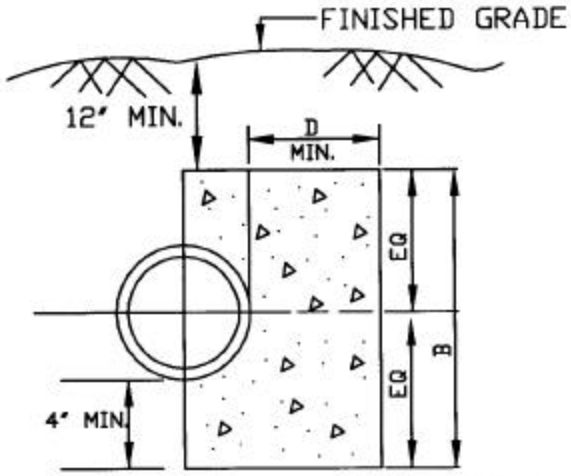
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN



CARRY CONCRETE TO
UNDISTURBED EARTH
OR FIRM SUBGRADE

SECTION

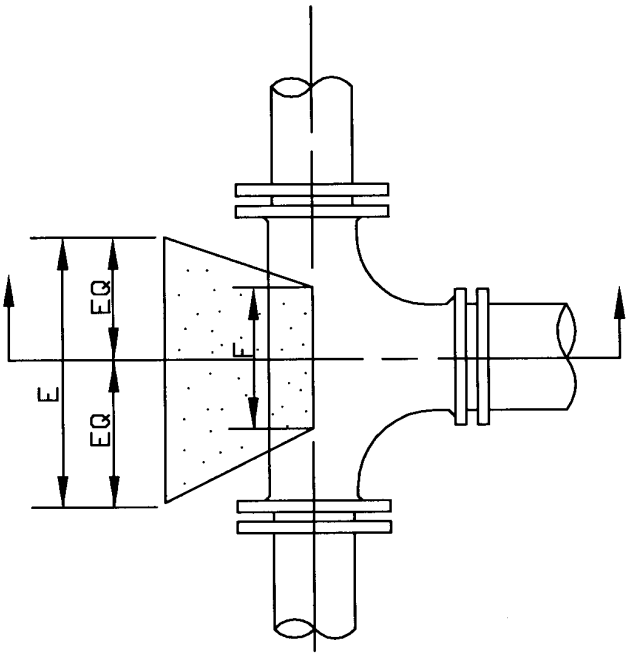
PIPE SIZE	11 1/4 BEND				22 1/2° BEND				45 ° BEND				90° BEND			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
4"	6"	1'-0"	4"	6"	8"	1'-0"	6"	7"	1'-1"	1'-0"	6"	6"	1'-10"	1'-0"	6"	1'-0"
6"	8"	1'-2"	6"	7"	10"	1'-2"	6"	8"	1'-4"	1'-2"	6"	8"	2'-3"	1'-2"	6"	1'-6"
8"	8"	1'-4"	8"	7"	1'-4"	1'-4"	8"	8"	2'-0"	1'-4"	8"	9"	3'-3"	1'-4"	8"	1'-6"
10"	1'-1"	1'-6"	8"	8"	1'-7"	1'-6"	8"	10"	2'-6"	1'-6"	8"	10"	3'-9"	2'-0"	10"	1'-6"
12"	1'-4"	1'-8"	1'-0"	9"	2'-0"	1'-8"	1'-0"	1'-0"	3'-3"	1'-8"	1'-0"	1'-0"	5'-0"	2'-0"	10"	1'-6"
16"	1'-9"	2'-0"	1'-0"	9"	2'-6"	2'-0"	1'-0"	1'-3"	4'-3"	2'-6"	1'-0"	1'-3"	6'-0"	2'-6"	1'-4"	1'-9"
18"	1'-9"	2'-6"	1'-0"	10"	3'-3"	2'-6"	1'-0"	1'-6"	6'-0"	2'-6"	1'-0"	1'-4"	8'-0"	3'-4"	1'-8"	1'-9"
20"	1'-9"	2'-6"	1'-0"	10"	3'-3"	2'-6"	1'-0"	1'-6"	6'-0"	2'-6"	1'-0"	1'-4"	8'-0"	3'-4"	1'-8"	1'-9"
24"	2'-0"	3'-0"	1'-0"	1'-0"	3'-9"	3'-0"	1'-0"	1'-6"	7'-0"	3'-0"	1'-0"	1'-9"	9'-9"	4'-0"	2'-0"	2'-0"

NOTE:

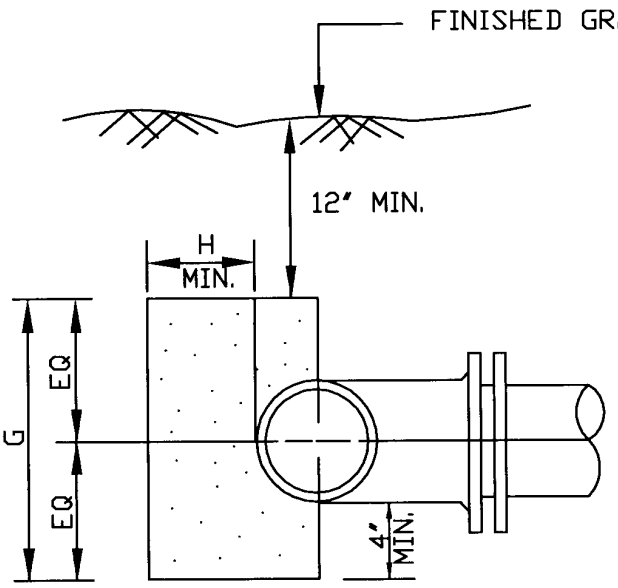
1.) BLOCKING DIMENSIONS ARE SHOWN AT A MINIMUM.
2.) BLOCKING DIMENSIONS ARE BASED ON A STATIC PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING CAPACITY OF 2000 PSF.
3.) WHERE SOIL BEARING CAPACITY IS LESS THAN OR GREATER THAN 2000 PSF, BLOCKING DESIGN CALCULATION ARE TO BE SHOWN ON THE PLANS.
4.) FITTINGS TO BE WRAP IN 4 MIL POLYETHYLENE TO PROTECT NUTS, BOLTS, OR OTHER.

DATE	BLOCKING DETAIL	DRWG. NO.
JAN. 1996	HORIZONTAL BENDS	BLK–1
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN



CARRY CONCRETE TO
UNDISTURBED EARTH
OR FIRM SUBGRADE

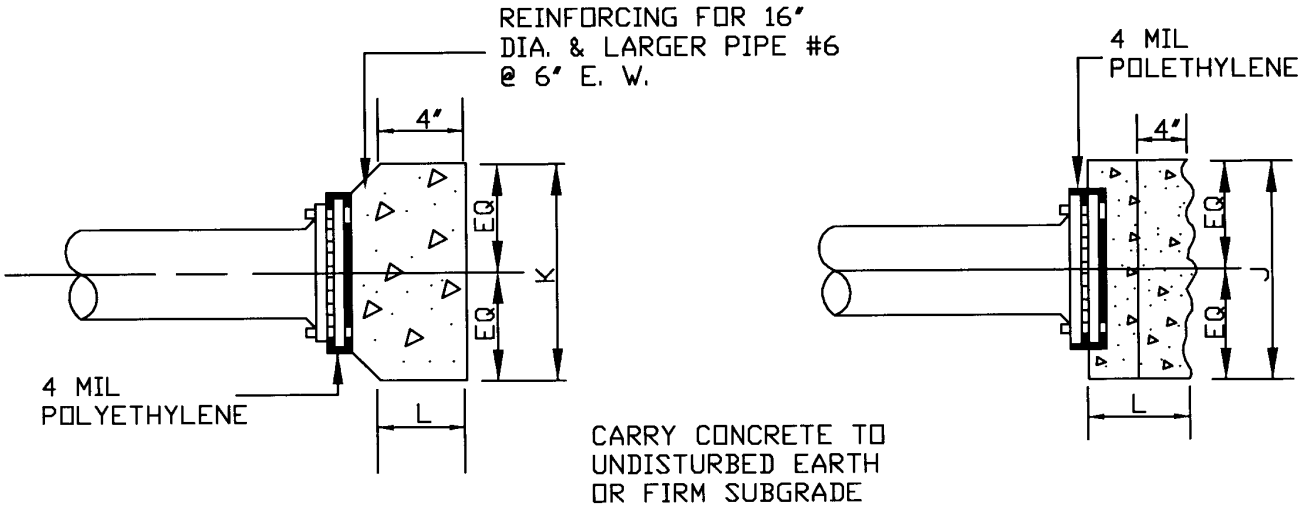
SECTION

BRANCH SIZE	E	F	G	H
4"	1'-0"	8"	1'-4"	6"
6"	1'-4"	1'-0"	1'-8"	8"
8"	1'-6"	1'-0"	2'-6"	9"
10"	2'-2"	1'-0"	2'-8"	10"
12"	2'-6"	1'-0"	3'-6"	1'-0"
16"	3'-4"	1'-4"	4'-8"	1'-2"
18"	4'-0"	2'-0"	6'-0"	1'-6"
20"	4'-0"	2'-0"	6'-0"	1'-6"
24"	5'-0"	2'-0"	6'-8"	1'-8"

NOTE:
SEE APPLICABLE NOTES AS SHOWN ON BLK-1.

DATE		DRWG. NO.
JAN. 1996	BLOCKING DETAIL	BLK-2
REVISIONS	TEES	

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN

ELEVATION

SIZE	J	K	L
4"	1'-0"	1'-0"	8"
6"	1'-6"	1'-6"	8"
8"	2'-6"	1'-6"	10"
10"	2'-8"	2'-2"	1'-0"
12"	3'-6"	2'-6"	1'-2"
16"	4'-8"	3'-4"	1'-4"
18"	6'-0"	4'-0"	1'-6"
20"	6'-0"	4'-0"	1'-6"
24"	6'-8"	5'-0"	1'-8"

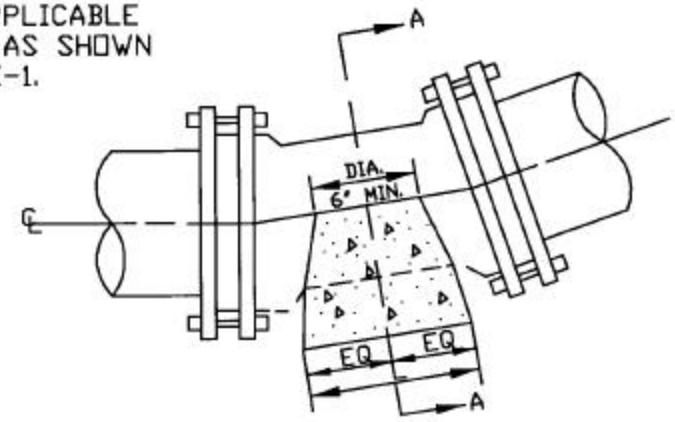
NOTE:
SEE APPLICABLE NOTES AS SHOWN ON BLK-1.

NOTE: BLOCKING BASED ON PRESSURE OF 150 P.S.I. AND ALLOWABLE SOIL BEARING CAPACITY OF 2000 P.S.F. CONCRETE TO BE 3000 P.S.I.

DATE	BLOCKING DETAIL	DRWG. NO.
JAN. 1996	PLUGS, CAPS, AND HYDRANTS	BLK-3
REVISIONS		

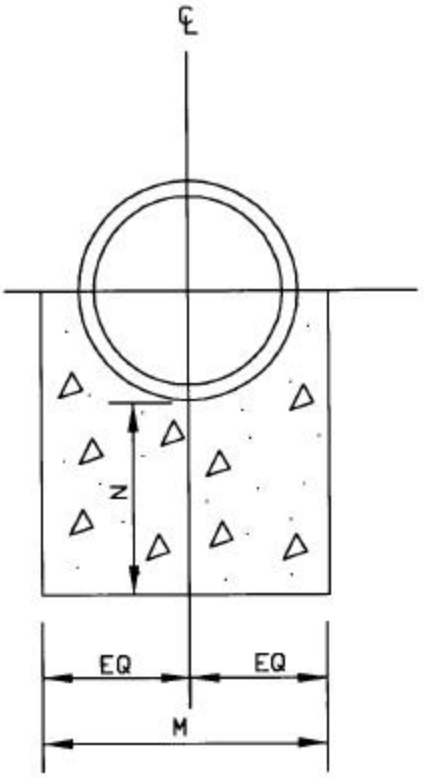
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTE:
SEE APPLICABLE NOTES AS SHOWN ON BLK-1.



ELEVATION

CARRY CONCRETE TO UNDISTURBED EARTH OR FIRM SUBGRADE.



SECTION A-A

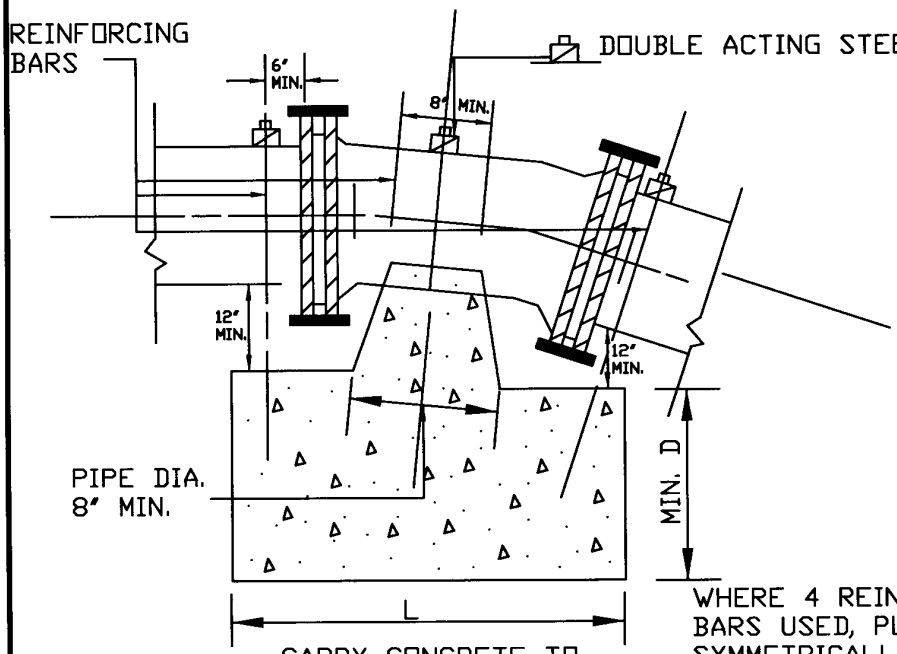
PIPE SIZE	11-1/4° BEND			22-1/2° BEND			45° BEND		
	L	M	N	L	M	N	L	M	N
6"	6"	1'-2"	8"	10"	1'-2"	8"	1'-2"	1'-2"	8"
8"	8"	1'-4"	8"	11"	1'-4"	8"	1'-9"	1'-4"	8"
10"	8"	1'-6"	8"	1'-3"	1'-6"	9"	2'-5"	1'-6"	1'-0"
12"	8"	2'-0"	8"	1'-4"	2'-0"	9"	2'-8"	2'-0"	1'-2"
16"	1'-1"	2'-4"	9"	2'-1"	2'-4"	1'-0"	4'-0"	2'-4"	1'-6"
18"	1'-5"	2'-8"	10"	2'-9"	2'-8"	1'-2"	5'-6"	2'-8"	2'-0"
20"	1'-5"	2'-8"	10"	2'-9"	2'-8"	1'-2"	5'-6"	2'-8"	2'-0"
24"	1'-10"	3'-0"	1'-0"	3'-7"	3'-0"	1'-4"	6'-0"	3'-6"	2'-6"

NOTE: BLOCKING BASED ON PRESSURE OF 150 PSI AND ALLOWABLE SOIL BEARING CAPACITY OF 2000 PSF. CONCRETE TO BE 3000 PSI.

DATE	BLOCKING DETAIL	DRWG. NO.
JAN. 1996	LOWER VERTICAL BENDS	BLK-4
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

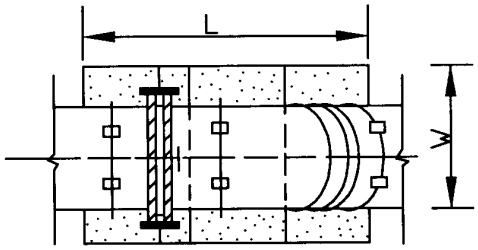
NOTES:
SEE APPLICABLE NOTES AS SHOWN ON BLK-1.



CARRY CONCRETE TO UNDISTURBED EARTH OR FIRM SUBGRADE

ELEVATION

EMBED REINFORCING BARS MIN. 36 DIAMETERS INCLUDING HOOK PAINT EXPOSED REINF. BARS WITH 2 COATS OF BITUMINOUS PAINT.



WHERE 4 REINFORCING BARS USED, PLACE 2 SYMMETRICALLY PLACED REINFORCING BARS AT BENDS AND OTHER 2 BARS AS SHOWN IN DETAIL.

PLAN

PIPE SIZE	11 1/4° BEND				22 1/2° BEND				45° BEND			
	L	W	D	REINF.BAR # & SIZE	L	W	D	REINF.BAR # & SIZE	L	W	D	REINF.BAR # & SIZE
6"	2'-0"	2'-0"	1'-6"	3 # 7	2'-6"	2'-6"	2'-0"	3 # 7	3'-0"	3'-0"	2'-0"	3 # 7
8"	2'-0"	2'-0"	2'-0"	3 # 8	2'-9"	2'-9"	2'-3"	3 # 8	3'-6"	3'-6"	2'-6"	3 # 8
10"	2'-3"	2'-3"	2'-0"	3 # 8	3'-6"	3'-6"	2'-3"	3 # 8	4'-0"	4'-0"	2'-9"	4 # 8
12"	2'-6"	2'-6"	2'-3"	3 # 8	4'-0"	4'-0"	2'-6"	4 # 8	4'-6"	4'-6"	3'-0"	4 # 8
16"	3'-3"	3'-3"	2'-6"	3 # 8	4'-6"	4'-6"	3'-0"	4 # 8	6'-0"	6'-0"	3'-6"	4 # 10
18"	4'-0"	4'-0"	2'-6"	3 # 10	5'-6"	5'-6"	3'-6"	3 # 10	7'-6"	7'-6"	4'-0"	4 # 10
20"	4'-0"	4'-0"	2'-6"	3 # 10	5'-6"	5'-6"	3'-6"	3 # 10	7'-6"	7'-6"	4'-0"	4 # 10
24"	4'-6"	4'-6"	3'-0"	3 # 10	6'-0"	6'-0"	4'-0"	4 # 10	8'-6"	8'-6"	4'-6"	4 # 10

NOTE: BLOCKING BASED ON PRESSURE OF 150 PSI AND ALLOWABLE SOIL BEARING CAPACITY OF 2000 PSF. CONCRETE TO BE 3000 PSI.

DATE	BLOCKING DETAIL	DRWG. NO.
JAN. 1996	UPPER VERTICAL BENDS	BLK-5
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

CARRIER PIPE DIA.	CASING PIPE DIAMETER	MINIMUM WALL THICKNESS			
		CRITERIA WITHIN RAILROAD RIGHT OF WAY		CRITERIA WITHIN VDOT RIGHT OF WAY	
		R.C.P. WITH PROTECTIVE COATING	STEEL WITH PROTECTIVE COATING	R.C.P.	STEEL
6"	16"	3.0"	0.281"	3.0"	0.250"
8"	20"	3.0"	0.375"	3.0"	0.250"
10"	20"	3.0"	0.375"	3.0"	0.250"
12"	24"	3.5"	0.375"	3.5"	0.250"
15"	24"	3.5"	0.375"	3.5"	0.250"
✳ 16"	24"	3.5"	0.375"	3.5"	0.250"
18"	30"	4.0"	0.500"	4.0"	0.375"
20"	30"	4.0"	0.500"	4.0"	0.375"
21"	30"	4.0"	0.500"	4.0"	0.375"
24"	36"	4.5"	0.563"	4.5"	0.375"
30"	42"	5.0"	0.625"	5.0"	0.500"
33"	42"	5.0"	0.625"	5.0"	0.500"
36"	48"	5.5"	0.688"	5.5"	0.500"
42"	54"	6.0"	0.781"	6.0"	0.500"

REINFORCED CONCRETE CASING PIPE SHALL BE ASTM C-76, CLASS III.
STEEL CASING PIPE SHALL BE ASTM 1-139, GRADE B.

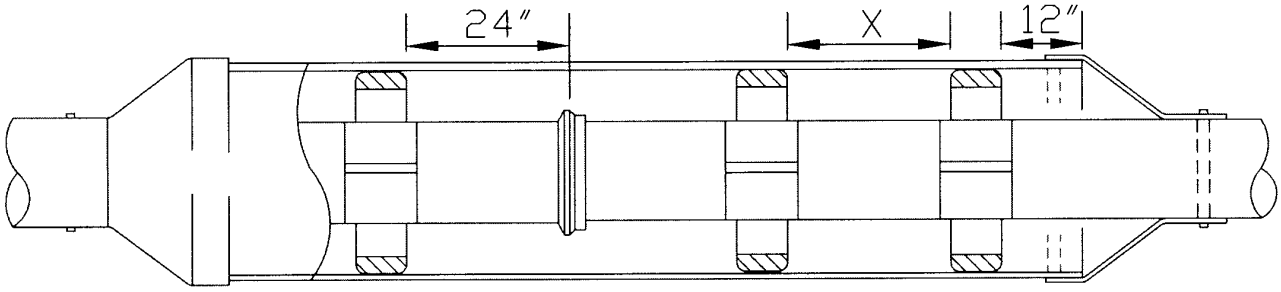
NOTES:

A. Slopes through bores shall not be based on minimum grade unless it is the only slope available.
B. Increasing thickness of casing must be considered where bore lengths exceed 125'.
C. When using steel casing, a minimum of .3125" thickness is required where ground cover over pipe exceed 15'.
D. Contractor shall make an effort to bore in the appropriate direction based on existing soil conditions. Engineer must show location and size of bore pit; and location and size of permanent and construction easement.
E. Where restraining devices are required for the carrier pipe, the casing pipe shall be increased as necessary.

✳ Where pipe is restrained, approved restrained joint pipe may be used to avoid having to install a 30' casing pipe.

DATE		DRWG. NO.
JAN. 1996	CASING PIPE REQUIREMENTS	CAS-1
REVISIONS JAN. 1999		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



CASING DETAIL NOTES:

1. CASING SPACERS FOR GRAVITY SEWER LINES MAY BE USED ONLY WHEN THE SLOPE OF THE FINISHED WELDED CASING PIPE HAS BEEN COMPLETED AND CHECKED AND IS EQUAL TO THE SLOPE OF THE CARRIER PIPE.

2. THREE CASING SPACERS SHALL BE ATTACHED TO EACH JOINT OF CARRIER PIPE WITH ONE AT THE CENTER AND ONE NOT MORE THAN 24″ FROM EACH END.

3. ONE CASING SPACER SHALL BE LOCATED NOT MORE THAN 12″ FROM EACH APPROVED STAINLESS STEEL CASING SPACER.

4. CARRIER PIPE SHALL BE POSITIONED AND RESTRAINED WITHIN CASING TO COMPLY WITH GRADE REQUIREMENTS BY AN APPROVED STAINLESS STEEL CASING SPACER.

5. STEEL CASING SHALL HAVE A MINIMUM YIELD STRENGTH OF 35,000 PSI AND SUFFICIENT CORROSION PROTECTION.

6. LINES TO BE ENCASED UNDER STATE ROADS/RAILROADS WILL COMPLY WITH COUNTY AND ANY APPLICABLE VDOT/AMERICAN RAILROAD ENGINEERING SPECIFICATIONS, WHICHEVER IS MORE STRINGENT.

7. WHEN INSTALLING CARRIER PIPE, CONTRACTOR SHALL PUSH SO THAT PIPE JOINTS ARE ALWAYS BEING COMPRESSED.

8. REINFORCED CONCRETE CASING PIPE SHALL BE ASTM C-76, CLASS III STEEL CASING PIPE SHALL BE ASTM-139, GRADE B.

9. CARRIER PIPE WITHIN BORES FOR SANITARY SEWER INSTALLATION SHALL BE DUCTILE IRON (CLASS 52) AND IS TO BE USED FROM MANHOLE TO MANHOLE.

10. CASING PIPE SHALL BE SEALED BY USE OF WRAPAROUND END SEALS OR WRAP ENDS OF CARRIER PIPE WITH TAR PAPER AND INSTALL 4″ THICK BRICK AND MORTAR PLUG IN THE ANNULAR SPACE WITH A 1″ WEEP HOLE.

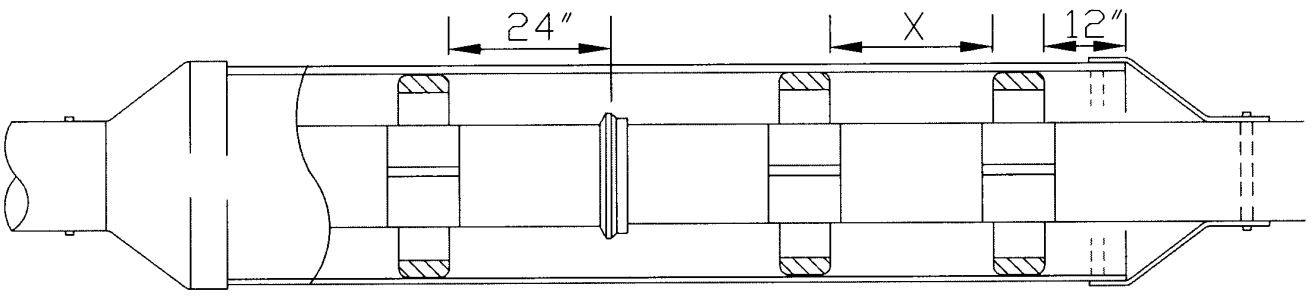
DATE JAN. 1996	CASING DETAIL FOR GRAVITY SEWER LINES	DRWG. NO. CAS-2
REVISIONS NOV. 1999		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

RESERVED FOR FUTURE USE

DATE JAN. 1996		DRWG. NO. CAS-3
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

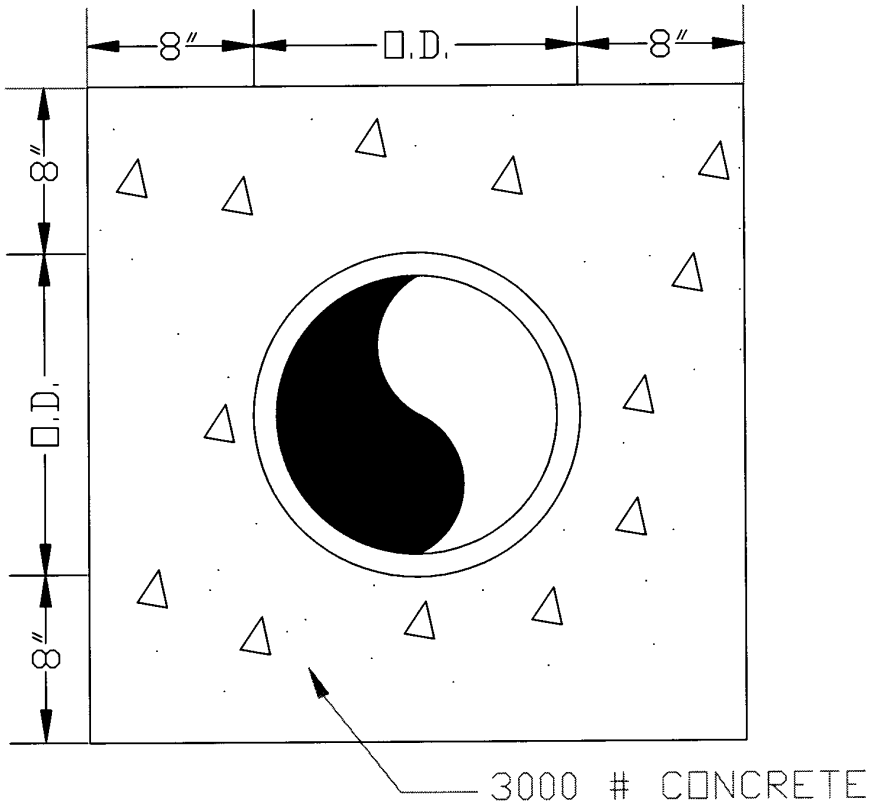


CASING DETAIL NOTES:

1. CARRIER PIPE SHALL BE CENTERED WITHIN CASING BY AN APPROVED STAINLESS STEEL CASING SPACER.
2. CASING PIPE SHALL BE SEALED BY USE OF WRAPAROUND END SEALS OR WRAP ENDS OF CARRIER PIPE WITH TAR PAPER AND INSTALL 4" THICK BRICK AND MORTAR PLUG IN THE ANNULAR SPACE A 1" WEEP HOLE.
3. THREE CASING SPACERS SHALL BE ATTACHED TO EACH JOINT OF CARRIER PIPE WITH ONE AT THE CENTER AND ONE NOT MORE THAN 24" FROM EACH END.
4. ONE CASING SPACER SHALL BE LOCATED NOT MORE THAN 12" FROM EACH END OF CASING PIPE.
5. VALVES OR OTHER CONTROL/MAINTENANCE EQUIPMENT ATTACHED TO WATERLINE/ SEWER FORCE MAINS SHALL BE LOCATED A MINIMUM FOUR PIPE LENGTHS FROM THE END OF THE CASING, OR AS APPROVED BY THE COUNTY.
6. STEEL CASING SHALL HAVE A MINIMUM YIELD STRENGTH OF 35,000 PSI AND SUFFICIENT CORROSION PROTECTION.
7. LINES TO BE ENCASED UNDER STATE ROADS/RAILROADS WILL COMPLY WITH COUNTY AND ANY APPLICABLE VDOT/AMERICAN RAILROAD ENDINEERING SPECIFICATIONS WHICHEVER IS MORE STRINGENT.
8. WHEN INSTALLING CARRIER PIPE, CONTRACTOR SHALL PUSH SO THAT PIPE JOINTS ARE ALWAYS BEING COMPRESSED.
9. REINFORCED CONCRETE CASING PIPE SHALL BE ASTM C-76, CLASS III STEEL CASING PIPE SHALL BE ASTM-139, GRADE B.
10. ALL WATERLINES IN CASING SHALL BE A MINIMUM CLASS 51 DUCTILE IRON WITH M.J. BELLS AND AN APPROVED MECHANICAL JOINT RESTRAINT DEVICE AT EACH M.J. CONNECTION. MINIMUM 3 JOINTS OUTSIDE EACH END OF CASING SHALL BE M.J. DUCTILE IRON WITH RESTRAINED JOINTS.

DATE	CASING DETAIL FOR WATER LINES & SEWER FORCE MAINS	DRWG. NO.
JAN. 1996		CAS-4
REVISIONS NOV. 1999		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE: NOT ALLOWED ON WATER LINE PROJECTS.

DATE JAN. 1996 REVISIONS OCT. 1996	PIPE ENCASEMENT DETAIL	DRWG. NO. CAS-5

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

PEAKING FORMULA (from average flows to peak flows)

a) 0-20 MGD: $Qd = 3.5Qa^{0.807}$
b) 20-50MGD: $Qd = 2Qa$

ENGINEER'S NAME ______________

COUNTY OF
CHESTERFIELD, VIRGINIA
DESIGN OF SANITARY SEWERS ("n"=___)

JOB NO. ______
DATE ______
DATUM FOR ELEVATION ______

SHEET NO. ____ OF ____
COMPUTED BY ______
CHECKED BY ______
APPROVED BY ______

LOCATION	LINE NO	MANHOLE NUMBER		AREA (ACRES)		POPULATION DENSITY PER ACRE	NO OF LOTS		AVG. FLOW/LOT	INCREMENTAL FLOW M.G.D.		TOTAL FLOW M.G.D.		LENGTH IN FEET	SLOPE %	DIAMETER OF PIPE	CAPACITY OF PIPE (FULL)	VELOCITY (FULL) FEET PER SEC.	VELOCITY (ACTUAL) FEET/SEC.	MISCEL. HEAD LOSSES	GROUND ELEVATION AT UPPER END	ELEVATION OF INVERT		DEPTH TO INVERT	REMARKS
		FROM	TO	INCREMENT	TOTAL		INCREMENT	TOTAL		AVERAGE DAILY FOR YEAR	PEAK FLOW	AVG	PEAK				M.G.D.					UPPER END	LOWER END		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

NOTE:
SIZE: MIN. 11"X17" DISPLAYED AS PART OF PLANS
ON A 24"X36" SHEET OF PAPER INDEXED AS PART OF PLANS.

DATE
JAN. 1996

REVISIONS

HYDRAULIC ANALYSIS FORM FOR SANITARY SEWER DESIGN

DRWG. NO.
DES-1

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTES:

1. ALL MATERIALS FOR SEWER AND WATER SYSTEMS SHOWN SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS OF CHESTERFIELD COUNTY APPLICABLE AT THE TIME OF NOTICE TO PROCEED.

2. FOR SEWER AND WATER INSTALLATION WITHIN EXISTING VDOT R/W; UTILITY CONTRACTORS MUST NOTIFY VDOT WHEN INSTALLATION BEGINS SO THAT DENSITY CAN BE TESTED ON TRENCH BACKFILL (95% ASTM. D-698 @ OPTIMUM MOISTURE $\pm$ 2%).

3. THE INSTALLATION OF A SEWER BACKFLOW DEVICE IS REQUIRED FOR ALL SERVICE CONNECTIONS WHERE THE FINISHED FLOOR ELEVATION IS LOWER THAN THE NEAREST DOWNGRADE AND/OR UPGRADE MANHOLE TOP ELEVATIONS. THIS DEVICE WILL BE INSPECTED BY THE BUILDING INSPECTION DEPARTMENT.

4. ALL WATER SERVICE CONNECTIONS BELOW THE ELEVATION CONTOUR OR WHERE THE PRESSURE IS GREATER THAN 80 P.S.I. WILL REQUIRE INDIVIDUAL PRESSURE REGULATORS AS REQUIRED BY BOCA CODE.

5. VERTICAL DATUM IS BASED ON MEAN SEA LEVEL (USC & GS DATUM). HORIZONTAL CONTROLS ARE BASED ON VIRGINIA STATE PLANE COORDINATE GRID, SOUTH ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83).

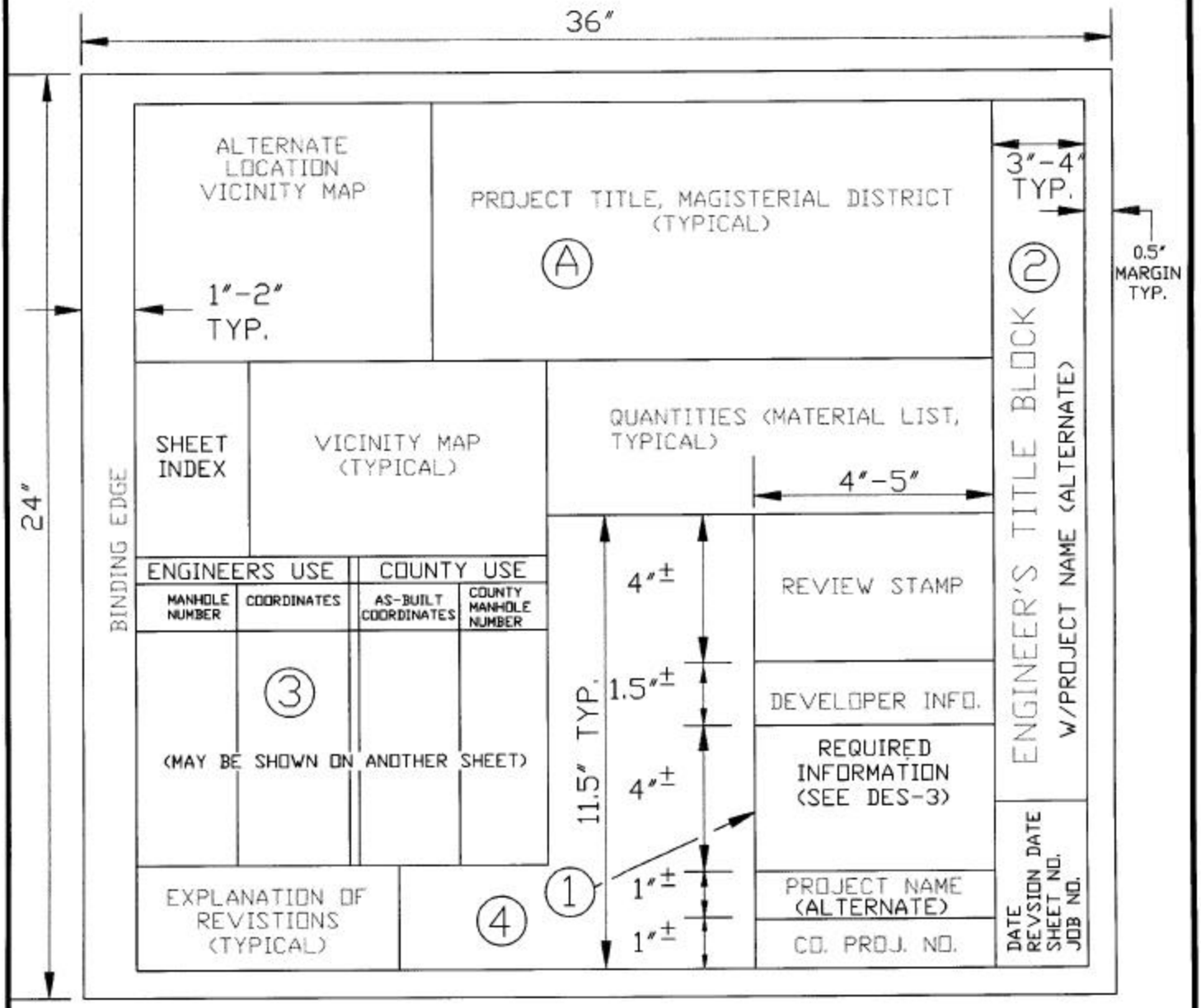
6. CONTRACTOR SHALL PROPERLY NOTIFY ALL PROPERTY OWNERS TWO (2) WEEKS PRIOR TO THE START OF ANY CONSTRUCTION (INCLUDING LAND CLEARING). NOTIFICATION SHALL BE IN THE FORM OF A LETTER SIMILAR TO THE "SAMPLE" REFLECTED IN THE COUNTY'S LATEST WATER AND SEWER SPECIFICATIONS (NOT-1).

REQUIRED INFORMATION FOR TITLE PAGE

APPLICANTS NAME _____
ZONING AND CASE# _____
NUMBER OF LOTS _____
TAX MAP NUMBER _____
DATE OF PLANNING _____
COMMISSION APPROVAL _____

DATE		DRWG. NO.
JAN. 1996	STANDARD SEWER AND WATER NOTES	DES-2
REVISIONS OCT. 1996		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTES:
① THIS INFORMATION IS REQUIRED TO BE IN THIS LOCATION.
② IF INFORMATION Ⓐ IS SHOWN IN THE ENGINEER'S TITLE BLOCK, THIS AREA CAN BE USED FOR OTHER PURPOSES.
③ THE TABLE OF COORDINATES MAY BE IN TYPED FORMAT, (LOCATION OPTIONAL)
④ REMAINING SPACE TO INCLUDE REQUIRED NOTES (SEE DES-2), LEGEND, GENERAL NOTES AND OTHER PERTINENT INFORMATION.

DATE	STANDARD COVER SHEET FOR UTILITY PROJECTS	DRWG. NO.
JAN. 1996		DES-3
REVISIONS OCT. 1996		

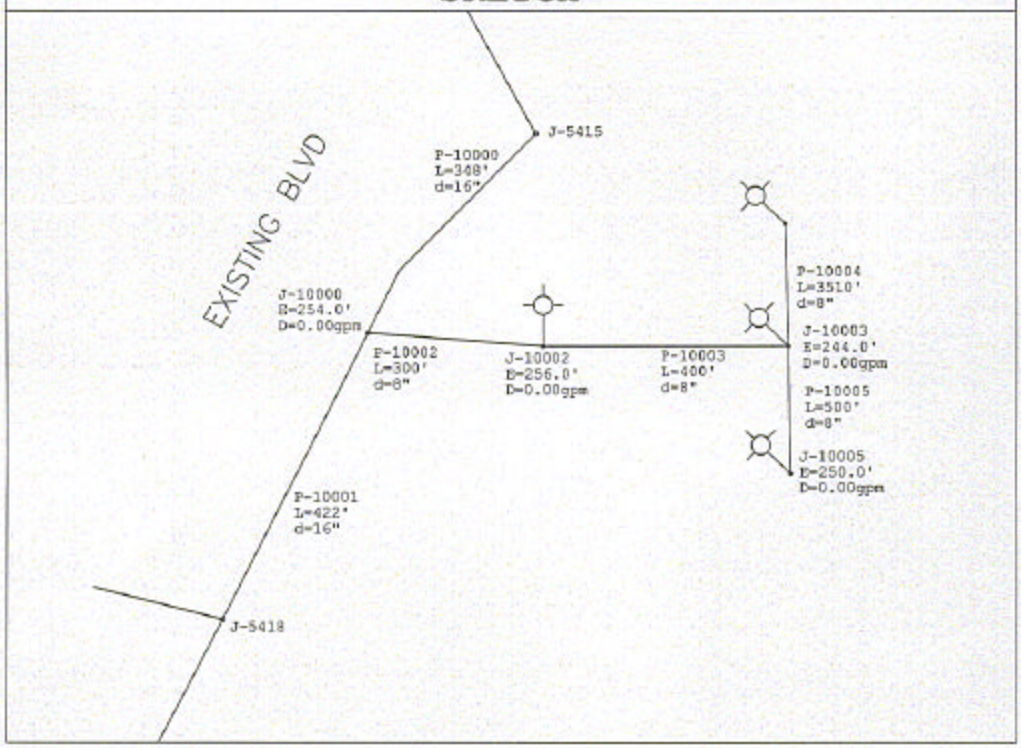
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTE:

THE SKETCH REFLECTS "SAMPLE" DATA
NOT RELATED TO AN ACTUAL PROJECT!

PROJECT NAME
UTILITIES PROJECT #
DATE
MAILING ADDRESS
FAX NUMBER

SKETCH



TABLE

FLOW CONDITION	J10002	J10003	J10004	J10005
MAX DAY STATIC	71	76	69	74
MAX DAY + 1000@J10002	58	----	----	----
MAX DAY + 1000@J10003	----	59	----	----
MAX DAY + 1000@J10004	----	----	49	----
MAX DAY + 1000@J10005	----	----	----	52

DATE **JUNE 2000**	**FLOW TEST RESULTS FOR RESIDENTIAL SUBDIVISIONS**	DRWG. NO. **DES-4**
REVISIONS **MARCH 2002**		

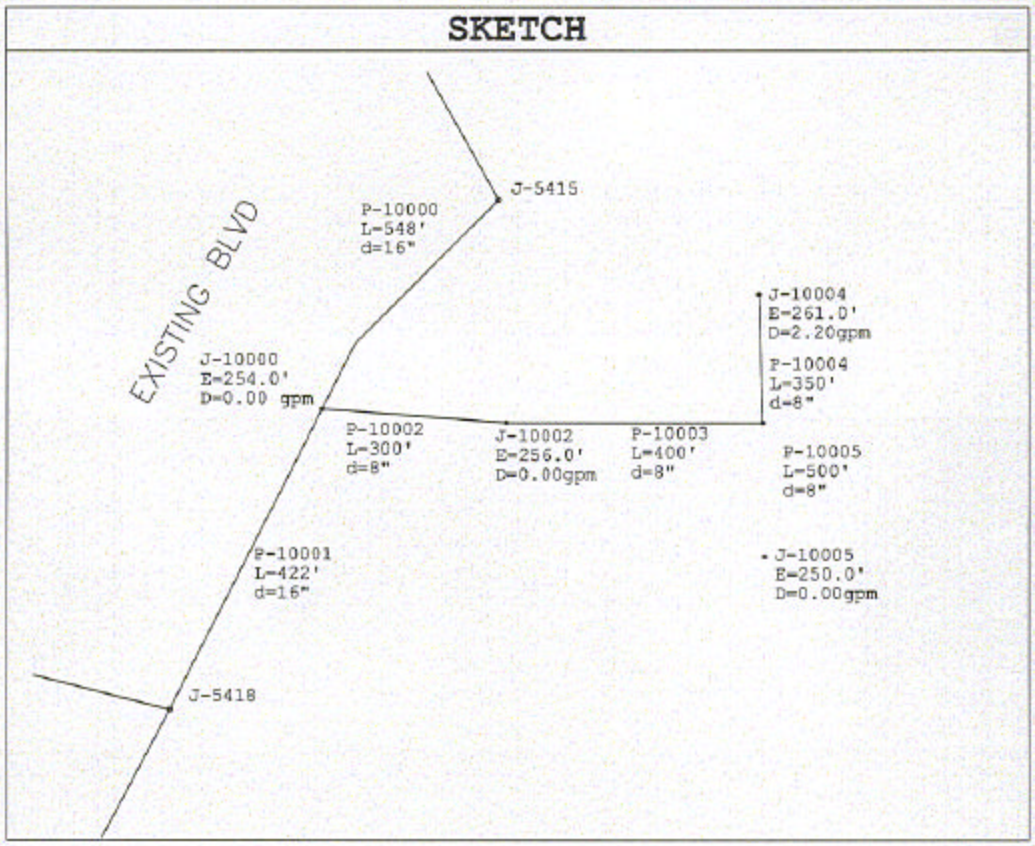
DEPARTMENT OF PUBLIC UTILITIES
CHESTERFIELD COUNTY

NOTE:

THE SKETCH REFLECTS "SAMPLE" DATA
NOT RELATED TO AN ACTUAL PROJECT!

PROJECT NAME
UTILITIES PROJECT #
DATE
MAILING ADDRESS
FAX NUMBER

SKETCH



TABLE

FLOW CONDITION	J10002	J10003	J10004	J10005
MAX DAY STATIC	71	76	69	74
MAX DAY + 1000@J10002	58	----	----	----
MAX DAY + 1000@J10003	----	59	----	----
MAX DAY + 1000@J10004	----	----	49	----
MAX DAY + 1000@J10005	----	----	----	52
*ISO FLOWS (2000 gpm)	----	----	43	46

*ISO FLOWS = Flow indicated at bottom of ISO Calculation Sheet: in this case ISO required flow is 2000 gpm - 1000 gpm @ J10004 + 1000 gpm @ J10005, From ISO Calculation sheet, ISO Required Flow is 2000 gpm, required hydrants is 2, however, 4 required due to spacing.

DATE		DRWG. NO.
JUNE 2000	FLOW TEST RESULTS FOR SITE PLANS WITH FIRE SUPPRESSION SYSTEM	DES-5
REVISIONS MARCH 2002		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

(Date)

(NAME)
(COMPANY)
(ADDRESS)

RE:
County Project #
Tile #

Dear,

As per your request, this office has completed a computer simulated fire flow test for the above referenced Project, The test was conducted at _____ . The test results for maximum day demand are attached on the next page.

Static pressure at maximum day domestic is _____ psi.

The maximum design flow is _____ gpm, to maintain the required minimum pressure of 20 psi throughout the pressure zone.

The elevation of the test was _____ feet.

This project is located in the _____ Pressure Zone.

This test was conducted with the following parameters:

_____ tank at ____ feet.
_____ tank at ____ feet.
_____ pumps (ON/OFF).
_____ pumps (ON/OFF).

These flow test results were based upon information available to the County at the time tests were performed. The variability of the water system due to changes in usage, demand, and operating conditions precludes guarantee by the Utilities Department that on-site expectations regarding pressures and flows will be exacting.

This information is being provided to you as a public service. WE DO NOT GUARANTEE ITS ACCURACY. By using it in any way, you are agreeing to release the County, its employees and officials from responsibility for any consequence(s) if it proves to be inaccurate.

Sincerely,

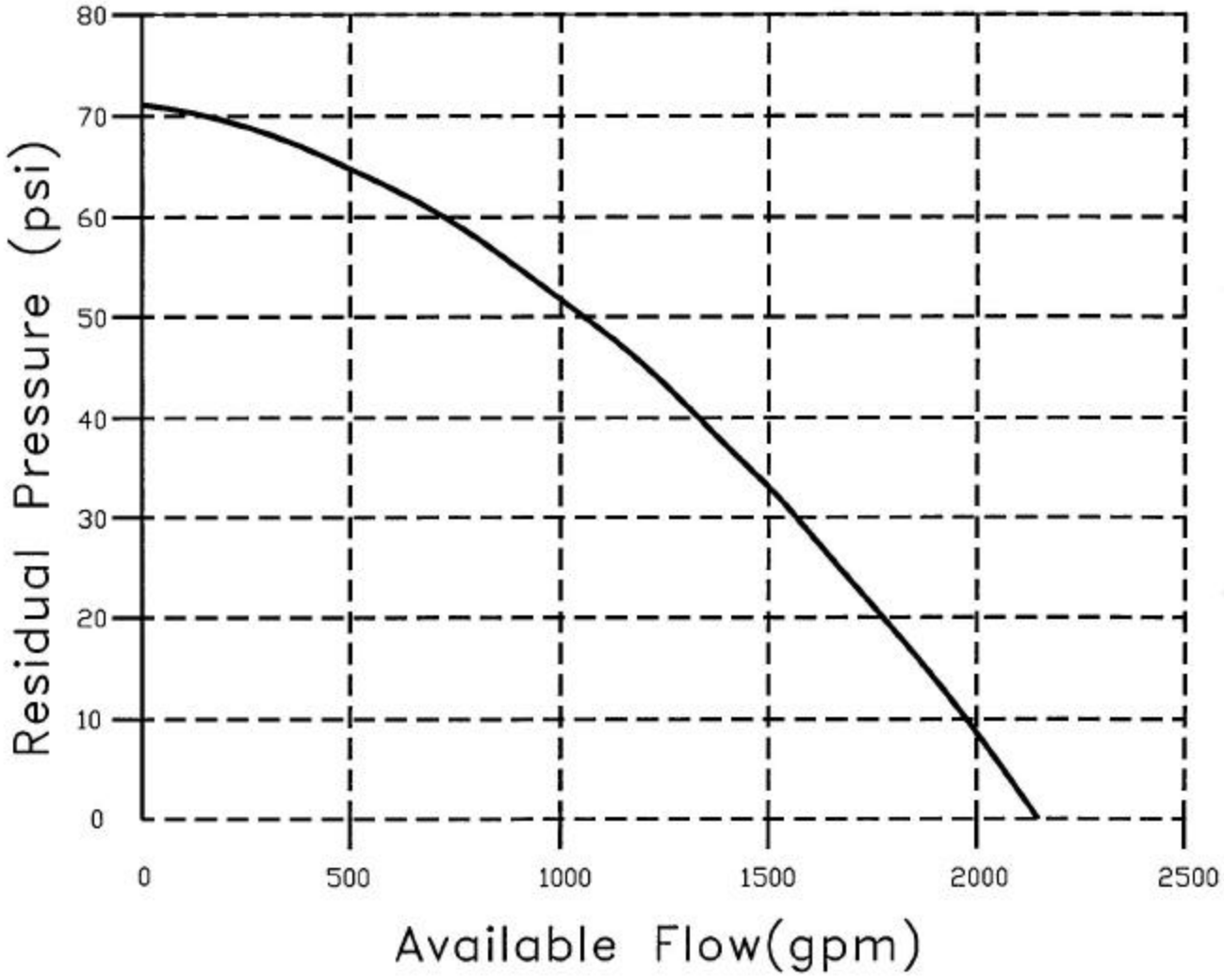
(NAME)
(Title)

cc: Frank Kinnier Fire Administration

DATE JUNE 2000	**FLOW TEST INFORMATION FORM**	DRWG. NO. **DES-6**
REVISIONS MARCH 2002		Sht. 1 of 2

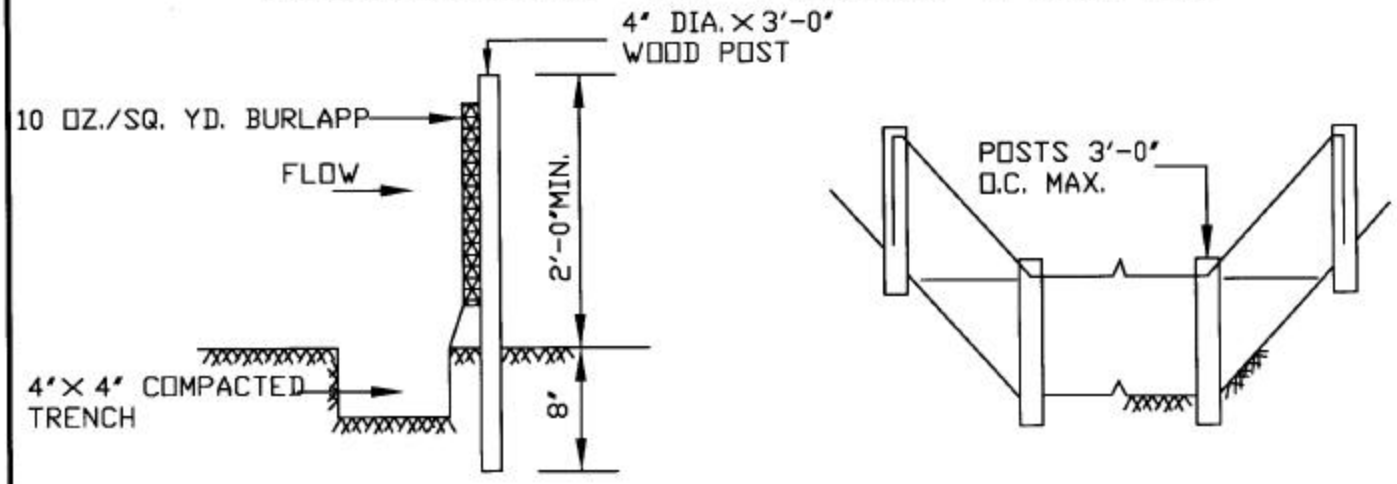
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

Hydrant Curve for
Junction J–xxxx at Steady hrs



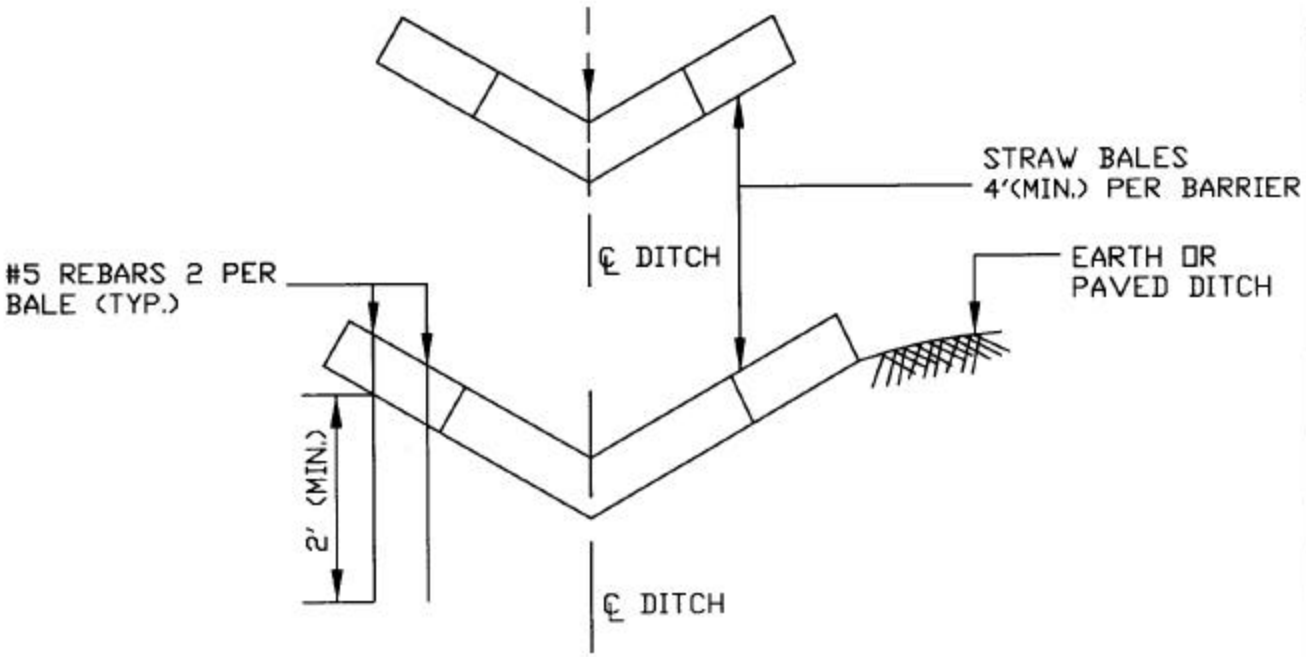
DATE **JUNE 2000**	**FLOW TEST INFORMATION FORM**	DRWG. NO. **DES-6**
REVISIONS **MARCH 2002**		(sht. 2 of 2)

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



SEDIMENTATION BARRIER (SED-1)

NOT TO SCALE



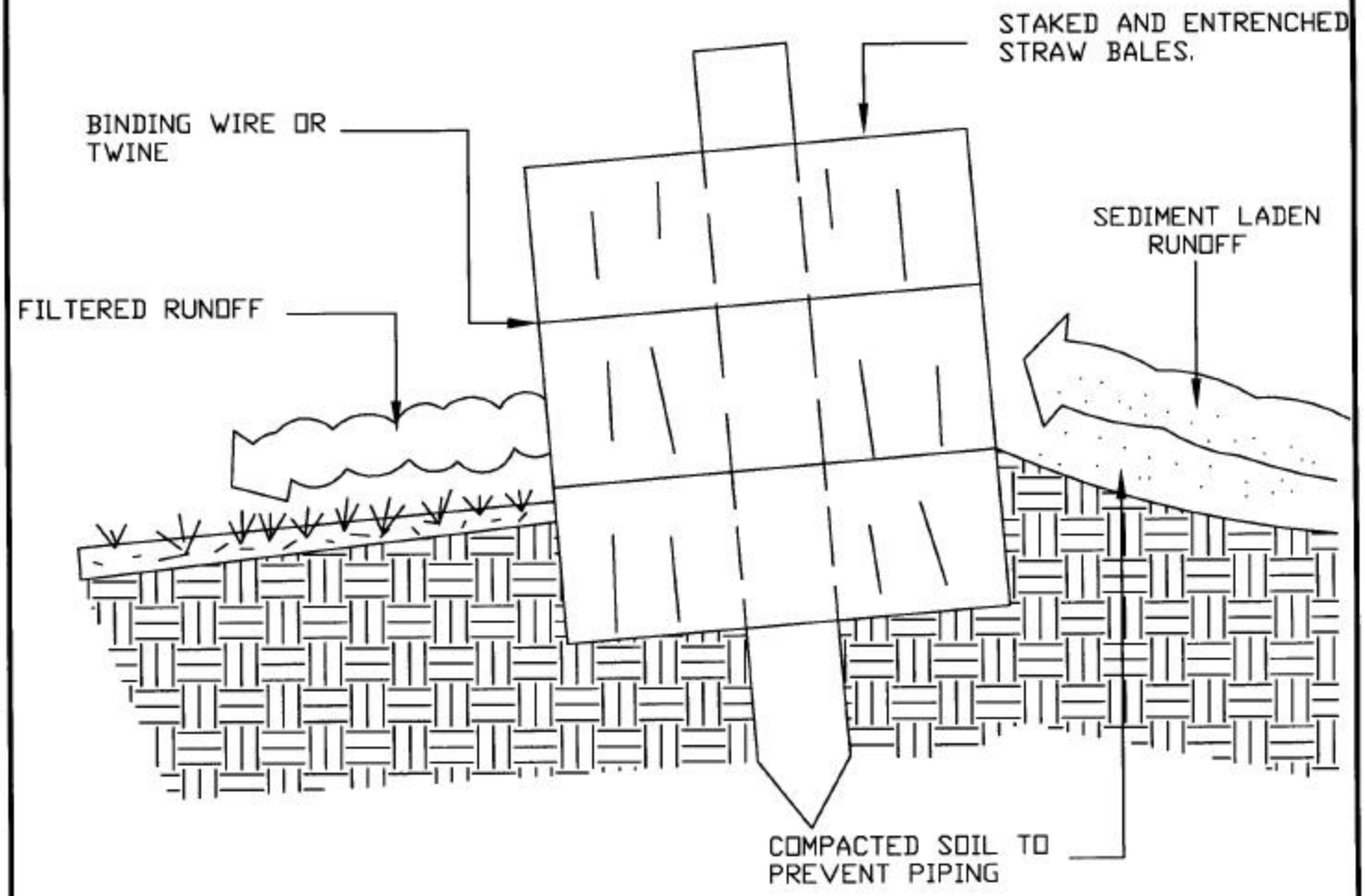
STRAW BALE SILT BARRIER (S.B.-1)

NOT TO SCALE

DATE		DRWG. NO.
JAN. 1996	SEDIMENTATION BARRIER (SED.-1) STRAW BALE SILT BARRIER (S.B.-1)	EC-1
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

CROSS-SECTION OF A PROPERLY INSTALLED STRAW BALE

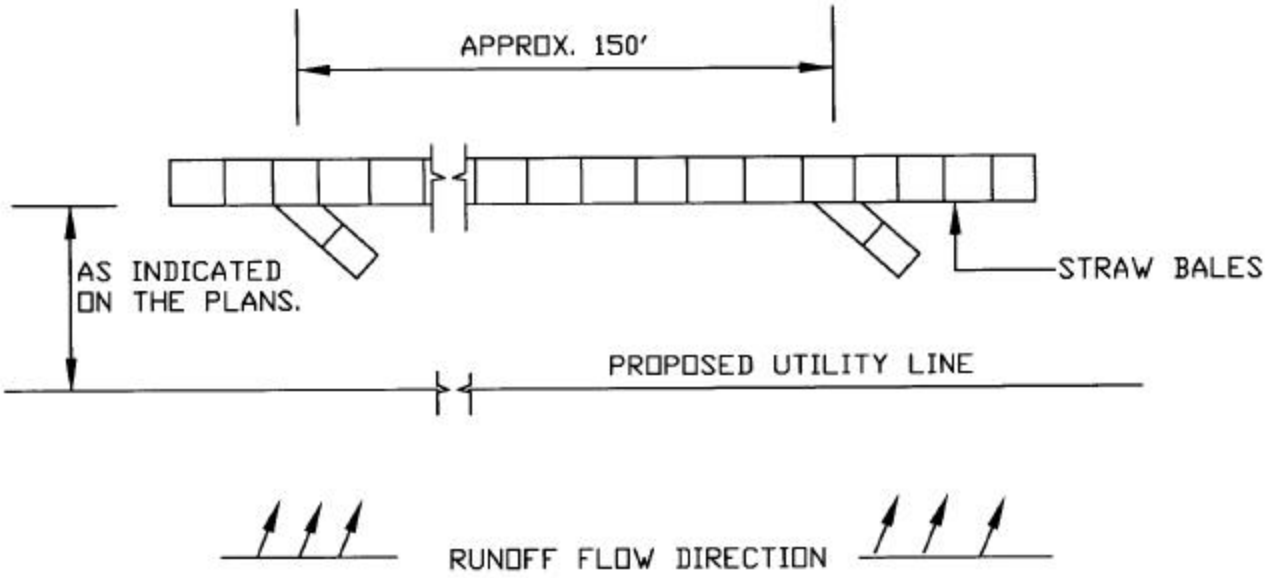


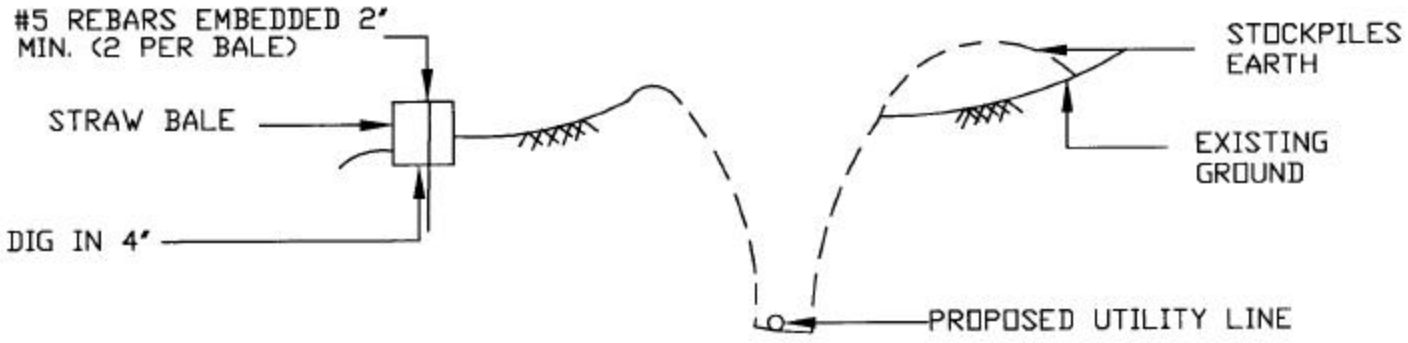
CONSTRUCTION OF A STRAW BALE BARRIER

1. EXCAVATE THE TRENCH.
2. PLACE AND STAKE STRAW BALES.
3. WEDGE LOOSE STRAW BETWEEN BALES.
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

DATE JAN. 1996	STRAW BALES	DRWG. NO. EC-2
REVISIONS		

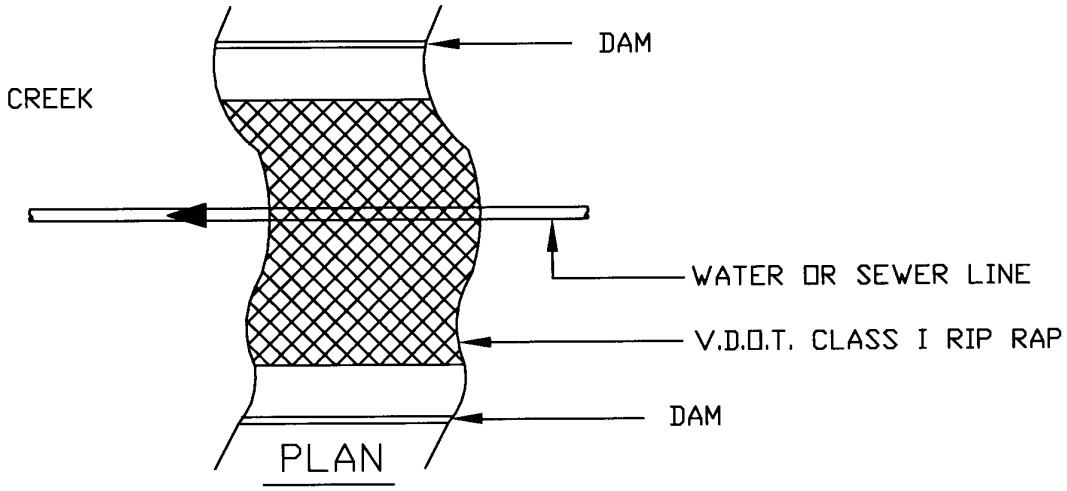
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



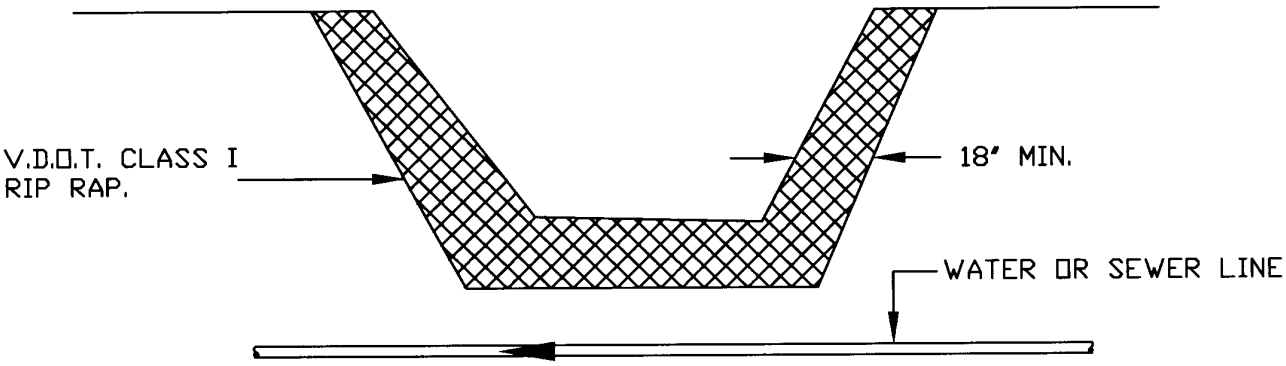


DATE JAN. 1996	TEMPORARY STRAW BALE (T.S.B.-1) RUN OFF SILTATION CONTROL	DRWG. NO. EC-3
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN



SECTION

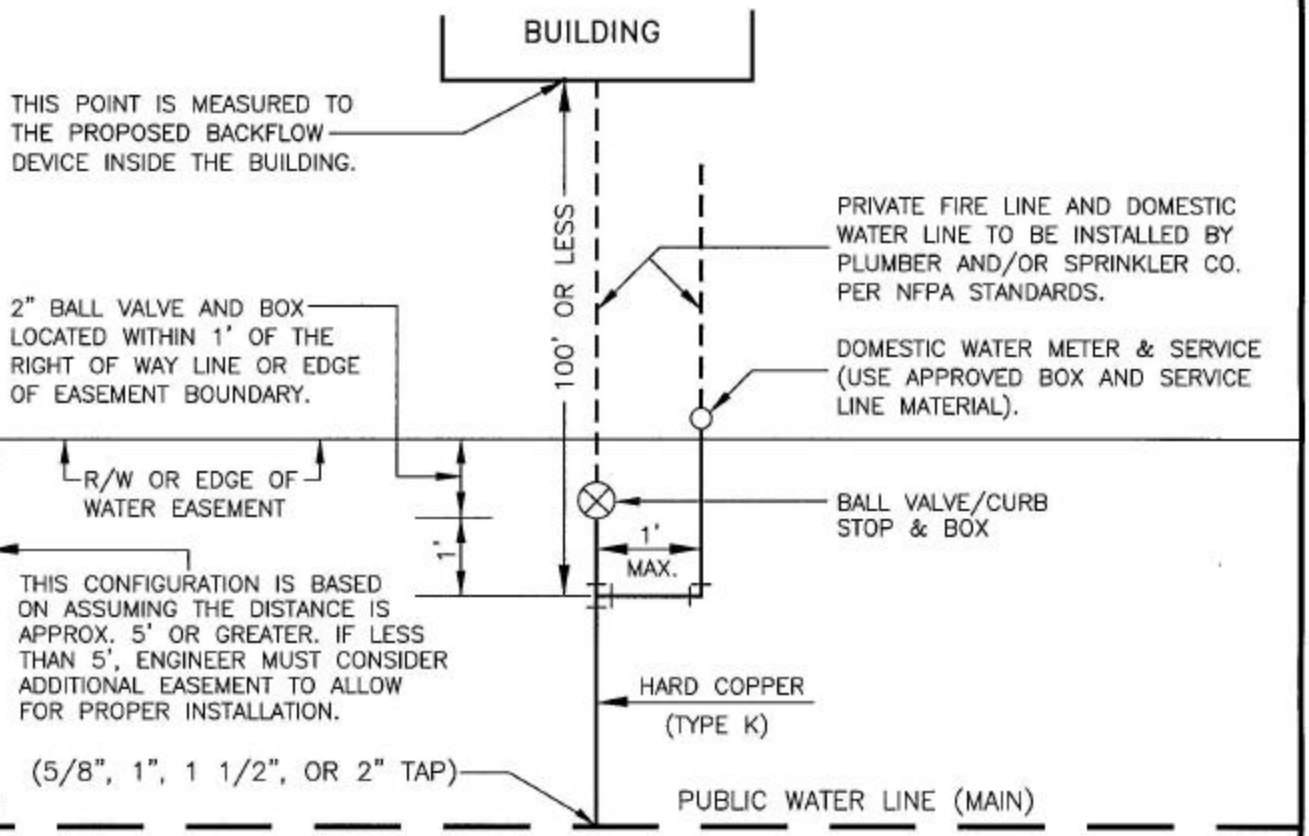
CREEK CROSSING DETAIL : NOT TO SCALE

NOTES:

1. DAMS ARE TO BE PLACED UPSTREAM AND DOWNSTREAM OUTSIDE THE LIMITS OF RIP-RAP. DAMS ARE TO BE REMOVED AFTER COMPLETION OF CREEK CROSSING.
2. METHOD AND MATERIAL FOR CONSTRUCTION OF DAMS SHALL BE APPROVED BY THE COUNTY.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR PASSING ALL WATER WHICH IS PUMPED FROM AREA BETWEEN DAMS THROUGH A FILTERING MEDIUM AND DISCHARGED AT LEAST 25 FEET FROM CREEK BANK.
4. ALL CREEK BANKS DISTURBED DURING CONSTRUCTION WILL BE RIP-RAPPED WITH VDOT CLASS I RIP-RAP.
5. CONTRACTOR HAS THE OPTION TO SUBMIT FOR APPROVAL, AT THE PRE-CONSTRUCTION CONFERENCE, AN ALTERNATE METHOD FOR THE UTILITY LINE CROSSING OF THE CREEK. THIS ALTERNATE METHOD SHALL INCLUDE PROCEDURES TO PREVENT SOIL EROSION, IN ACCORDANCE WITH CHESTERFIELD COUNTY EROSION AND SEDIMENT CONTROL HANDBOOK AND SHALL BE APPROVED BY THE COUNTY'S ENVIRONMENTAL ENGINEERING DEPARTMENT.

DATE JAN. 1996	CREEK CROSSING DETAIL	DRWG. NO. EC-4
REVISIONS		

DEPARTMENT OF PUBLIC UTILITIES



NOTES:

A. WHERE THE PUBLIC MAIN EXISTS, ALL WORK SHALL BE PERFORMED BY THE COUNTY UTILITIES DEPARTMENT UPON MAKING PROPER APPLICATION FOR SERVICE.

B. ON ALL NEW WATER MAINS, DEVELOPER SHALL HAVE HIS UTILITY CONTRACTOR (ACCEPTABLE TO THE UTILITIES DEPARTMENT) INSTALL, UP TO THE BALL VALVE AND WATER METER BOX, THE NECESSARY FIRE/DOMESTIC SERVICE COMBINATION, PLUS ANY OTHER REQUIRED SERVICES I.E., IRRIGATION, ETC.

C. WHERE FIRE LINE TO BUILDING IS 100' OR LESS FROM THE PUBLIC MAIN, THE FIRE LINE SYSTEM MAY BE INSTALLED ACCORDING TO THIS DETAIL OR IF THE OWNER CHOOSES TO HAVE THE DOUBLE-CHECK ASSEMBLY INSTALLED IN A VAULT OUTSIDE OF BUILDING, FIR-2 DETAIL MUST BE USED.

D. ALL FIRE LINES MUST HAVE AT LEAST 3.5 FEET OF GROUND COVER.

E. USE BALL VALVES AS MANUFACTURED BY FORD, McDONALD, OR APPROVED EQUAL.

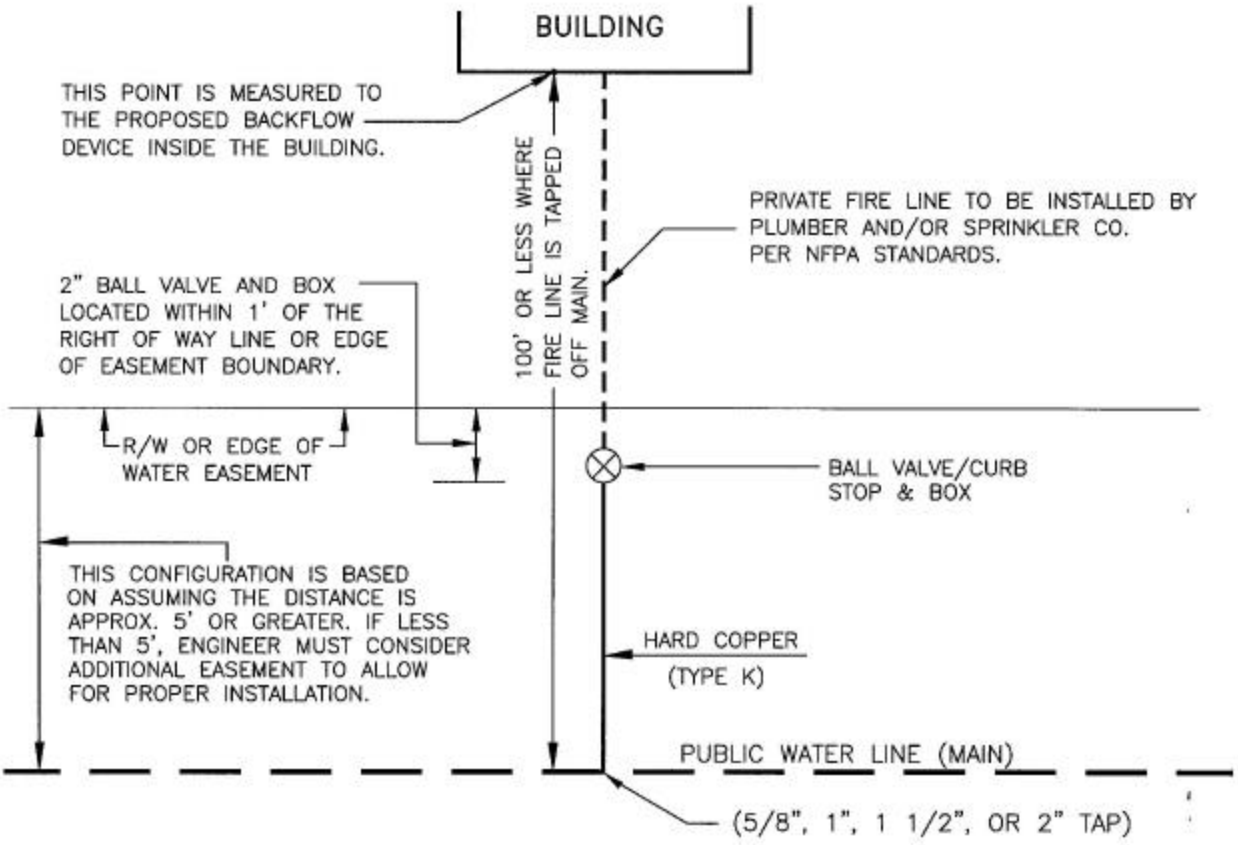
F. WHERE THIS DETAIL FOR A 2" COMBINED FIRE/DOMESTIC WATER LINE DOES NOT PROVIDE ADEQUATE SERVICE BECAUSE OF THE METER SIZE AND/OR AVAILABLE WATER PRESSURE, THE FIR-1A MAY BE USED.

G. CONNECTIONS FOR 1 1/2" AND 2" FIRE LINE SERVICES WILL BE SWEAT 95/5 (LEADLESS) SOLDER AND A SUITABLE FLUX; APPROVED COMPRESSION FITTINGS; OR A ProPress SYSTEM.

(100 FEET OR LESS)

DATE: JAN. 1996 REVISIONS: DEC. 2003	TYPICAL PLAN VIEW OF PROPOSED 2" OR SMALLER FIRE LINE SYSTEMS FOR NON SINGLE FAMILY RESIDENTIAL (WITH DOMESTIC SERVICE LINE)	DRWG. NO. FIR-1 (1of2)

DEPARTMENT OF PUBLIC UTILITIES



NOTES:

A. WHERE THE PUBLIC MAIN EXISTS, ALL WORK SHALL BE PERFORMED BY THE COUNTY UTILITIES DEPARTMENT UPON MAKING PROPER APPLICATION FOR SERVICE.

B. ON ALL NEW WATER MAINS, DEVELOPER SHALL HAVE HIS UTILITY CONTRACTOR (ACCEPTABLE TO THE UTILITIES DEPARTMENT) INSTALL A SINGLE FIRE LINE UP TO THE BALL VALVE AND WATER METER BOX.

C. WHERE FIRE LINE TO BUILDING IS 100' OR LESS FROM THE PUBLIC MAIN, THE FIRE LINE SYSTEM MAY BE INSTALLED ACCORDING TO THIS DETAIL OR IF THE OWNER CHOOSES TO HAVE THE DOUBLE-CHECK ASSEMBLY INSTALLED IN A VAULT OUTSIDE OF BUILDING, FIR-2 DETAIL MUST BE USED.

D. ALL FIRE LINES MUST HAVE AT LEAST 3.5 FEET OF GROUND COVER.

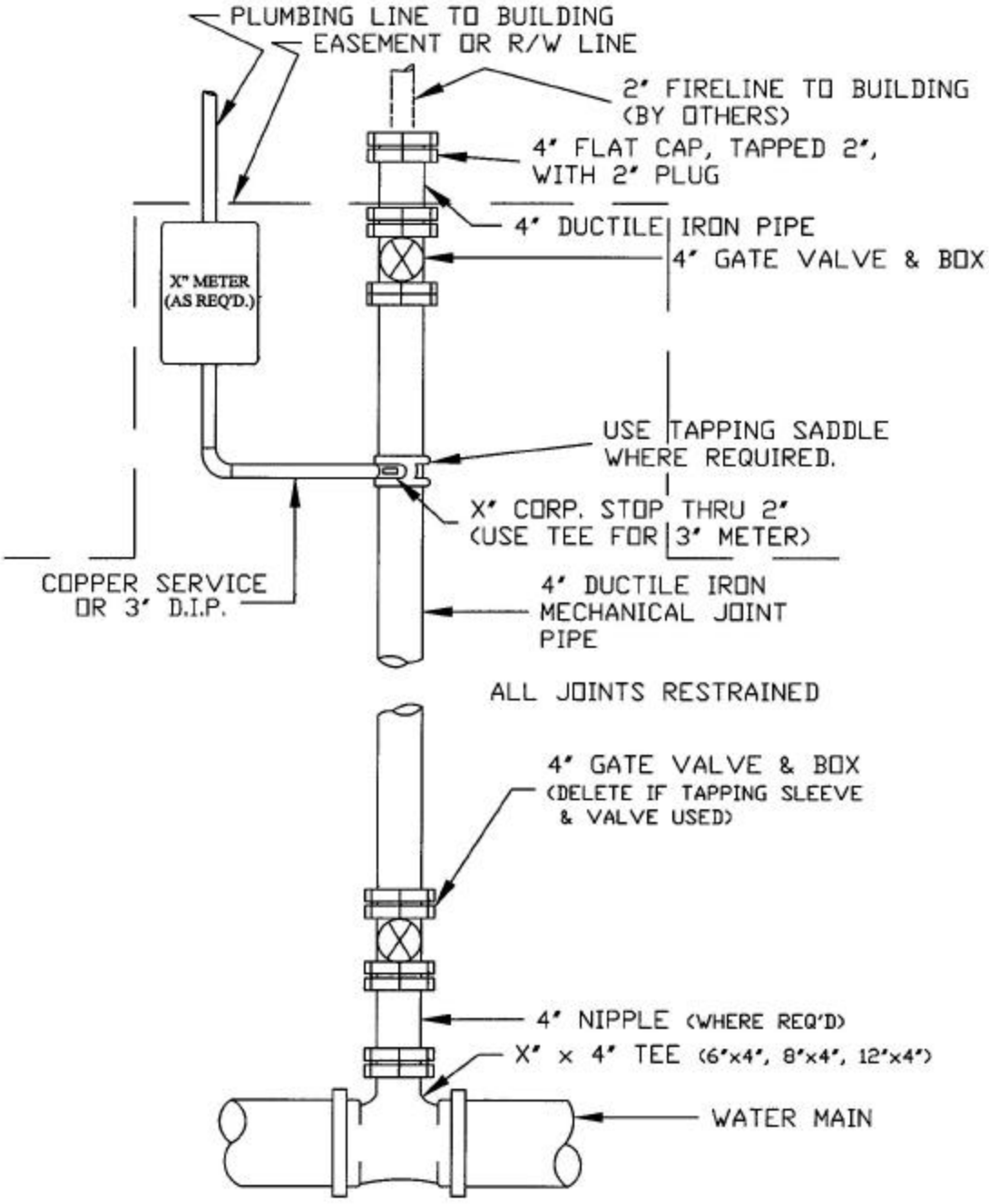
E. USE BALL VALVES AS MANUFACTURED BY FORD, McDONALD, OR APPROVED EQUAL.

F. CONNECTIONS FOR 1 1/2" AND 2" FIRE LINE SERVICES WILL BE SWEAT 95/5 (LEADLESS) SOLDER AND A SUITABLE FLUX; APPROVED COMPRESSION FITTINGS; OR A ProPress SYSTEM.

(100 FEET OR LESS)

DATE	TYPICAL PLAN VIEW OF PROPOSED 2" OR SMALLER FIRE LINE SYSTEMS FOR NON SINGLE FAMILY RESIDENTIAL (WITHOUT DOMESTIC SERVICE LINE)	DRWG. NO.
JAN. 2003		FIR-1 (2of2)
REVISIONS DEC. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



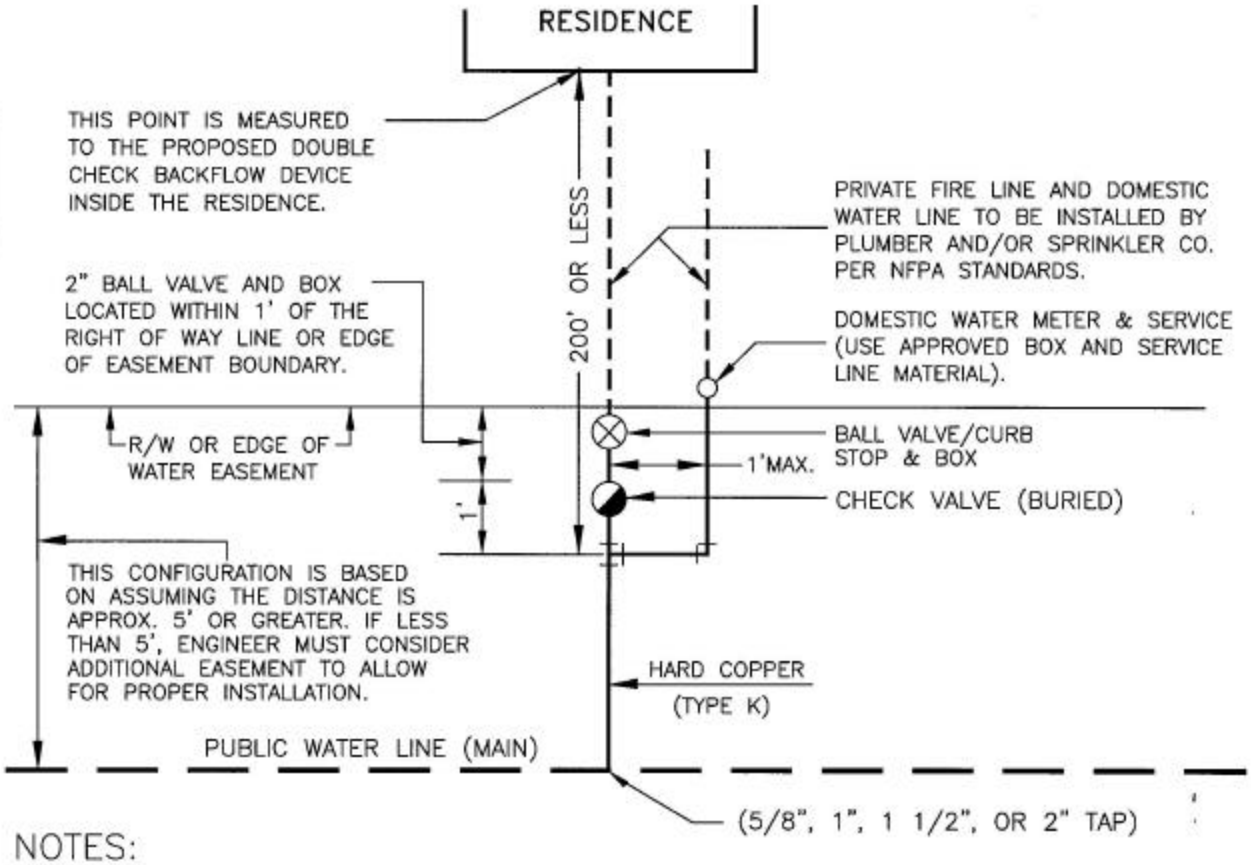
NOTES:

A. TAPPING SLEEVE AND VALVE MAY BE USED ON EXISTING LINES WITH PRIOR APPROVAL.

B. WHERE THE FIR-1 DETAIL; FOR A 2" COMBINED FIRE/DOMESTIC WATER LINE DOES NOT PROVIDE ADEQUATE SERVICE BECAUSE OF THE METER SIZE AND/OR AVAILABLE WATER PRESSURE, THE FIR-1A MAY BE USED.

DATE	TYPICAL PLAN VIEW OF	DRWG. NO.
JAN. 1999	4" SUPPLY LINE FOR 2" FIRE LINE SYSTEM.	FIR-1A
REVISIONS JAN. 2003		

DEPARTMENT OF PUBLIC UTILITIES



NOTES:

A. ON ALL NEW WATER MAINS, DEVELOPER SHALL HAVE HIS UTILITY CONTRACTOR (ACCEPTABLE TO THE UTILITIES DEPARTMENT) INSTALL, UP TO THE BALL VALVE AND WATER METER BOX, THE NECESSARY FIRE/DOMESTIC SERVICE COMBINATION, PLUS ANY OTHER REQUIRED SERVICES I.E., IRRIGATION, ETC.

B. WHERE FIRE LINE TO BUILDING IS 200' OR LESS FROM THE PUBLIC MAIN, THE FIRE LINE SYSTEM MAY BE INSTALLED ACCORDING TO THIS DETAIL OR IF THE OWNER CHOOSES TO HAVE THE DOUBLE-CHECK ASSEMBLY INSTALLED IN A VAULT OUTSIDE OF BUILDING, FIR-2 DETAIL MUST BE USED.

C. ALL FIRE LINES MUST HAVE AT LEAST 3.5 FEET OF GROUND COVER.

D. USE BALL VALVES AS MANUFACTURED BY FORD, McDONALD, OR APPROVED EQUAL.

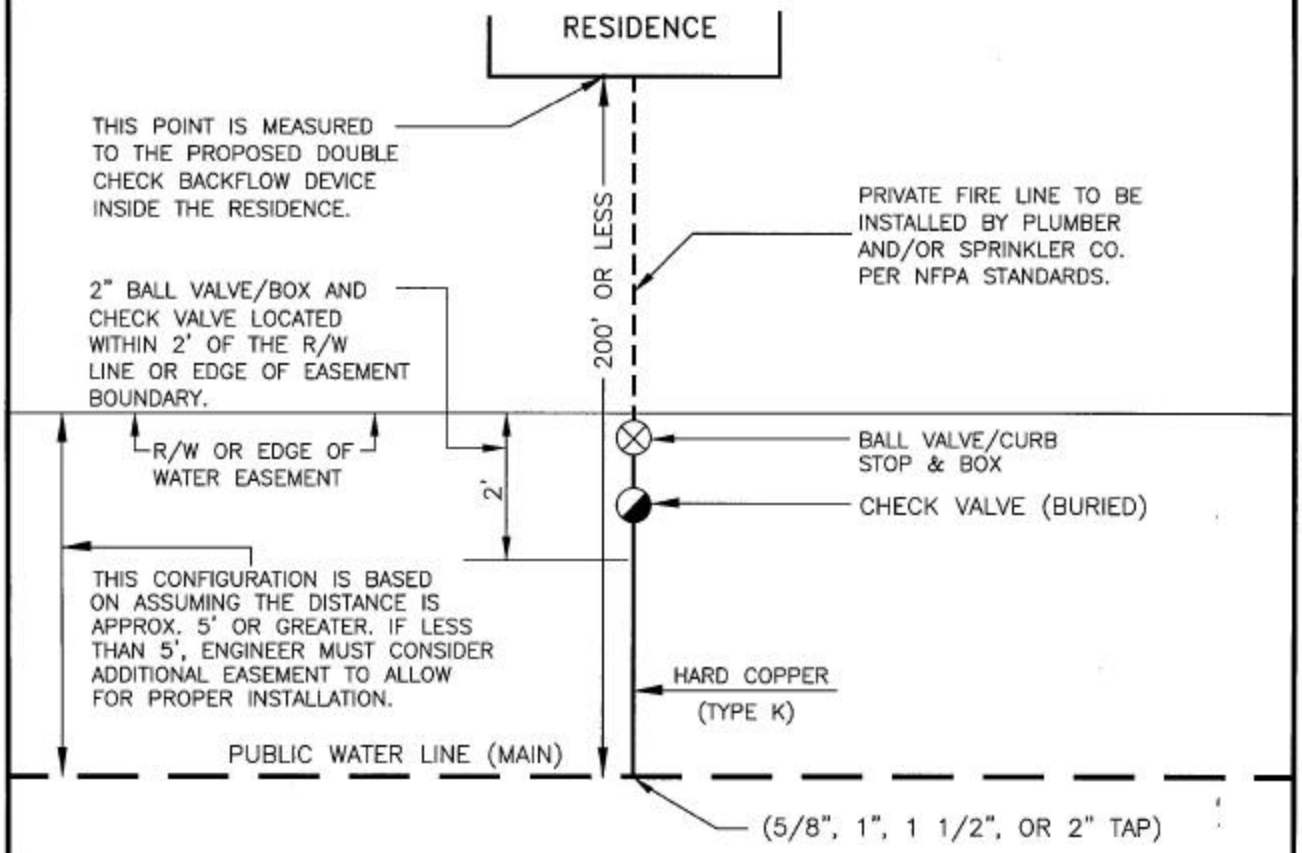
E. USE CHECK VALVES AS MANUFACTURED BY W.O.G. JENKINS; GRINNELL; OR APPROVED EQUAL.

F. CONNECTIONS FOR 1 1/2" AND 2" FIRE LINE SERVICES WILL BE SWEAT 95/5 (LEAD LESS) SOLDER AND A SUITABLE FLUX; APPROVED COMPRESSION FITTINGS; OR A ProPress SYSTEM.

(200 FEET OR LESS)

DATE DEC. 2003	TYPICAL PLAN VIEW OF PROPOSED 2" OR SMALLER SINGLE FAMILY RESIDENTIAL FIRE LINE SYSTEMS (WITH DOMESTIC SERVICE LINE)	DRWG. NO. FIR-1B NFPA 13D (1of2)
REVISIONS		

DEPARTMENT OF PUBLIC UTILITIES



NOTES:

A. ON ALL NEW WATER MAINS, DEVELOPER SHALL HAVE HIS UTILITY CONTRACTOR (ACCEPTABLE TO THE UTILITIES DEPARTMENT) INSTALL A SINGLE FIRE LINE UP TO THE BALL VALVE AND WATER METER BOX.

B. WHERE FIRE LINE TO BUILDING IS 200' OR LESS FROM THE PUBLIC MAIN, THE FIRE LINE SYSTEM MAY BE INSTALLED ACCORDING TO THIS DETAIL OR IF THE OWNER CHOOSES TO HAVE THE DOUBLE-CHECK ASSEMBLY INSTALLED IN A VAULT OUTSIDE OF BUILDING, FIR-2 DETAIL MUST BE USED.

C. ALL FIRE LINES MUST HAVE AT LEAST 3.5 FEET OF GROUND COVER.

D. USE BALL VALVES AS MANUFACTURED BY FORD, McDONALD, OR APPROVED EQUAL.

E. USE CHECK VALVES AS MANUFACTURED BY W.O.G. JENKINS; GRINNELL; OR APPROVED EQUAL.

F. CONNECTIONS FOR 1 1/2" AND 2" FIRE LINE SERVICES WILL BE SWEAT 95/5 (LEAD LESS) SOLDER AND A SUITABLE FLUX; APPROVED COMPRESSION FITTINGS; OR A ProPress SYSTEM.

(200 FEET OR LESS)

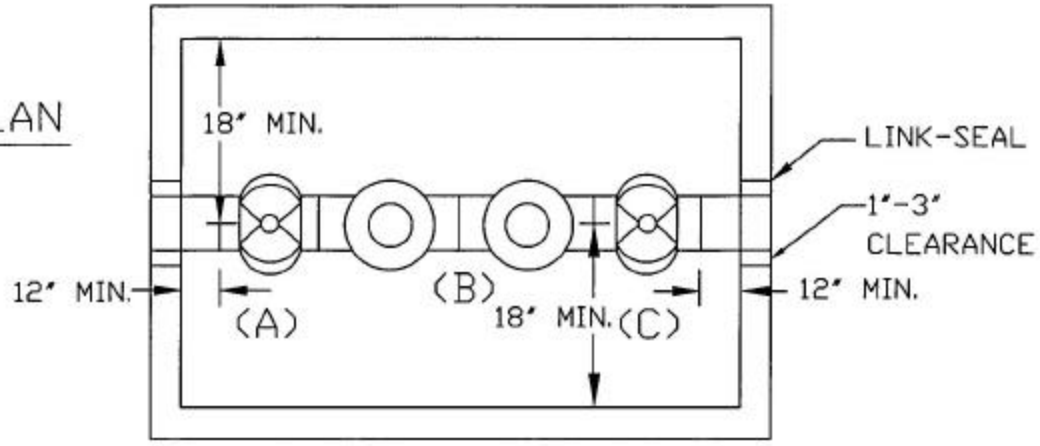
DATE DEC. 2003	TYPICAL PLAN VIEW OF PROPOSED 2" OR SMALLER SINGLE FAMILY RESIDENTIAL FIRE LINE SYSTEMS (WITHOUT DOMESTIC SERVICE LINE)	DRWG. NO. FIR-1B NFPA 13D (2of2)
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTE:

1. DOUBLE CHECK DEVICE SHALL BE INSTALLED IN A BOX AS NEAR TO THE WATER MAIN AS POSSIBLE WITHOUT PLACING BOX IN AREAS SUBJECT TO VEHICULAR TRAFFIC.
2. DOUBLE CHECK ASSEMBLY MUST BE U.L. LISTED OR F.M. APPROVED AND APPROVED BY CHESTERFIELD COUNTY'S DEPT. OF UTILITIES (SEE PART IV AND PART V OF THE SPECIFICATIONS.
3. FIRE SUPPRESSION LINE SHALL BE INSTALLED IN ACCORDANCE WITH DETAIL FIR-1.
4. THE VAULT SHALL BE WATERTIGHT. THE VAULT SHALL BE COATED ON THE OUTSIDE FACE WITH A MASTIC OR BITUMINOUS COATING TO PREVENT INFILTRATION.

PLAN

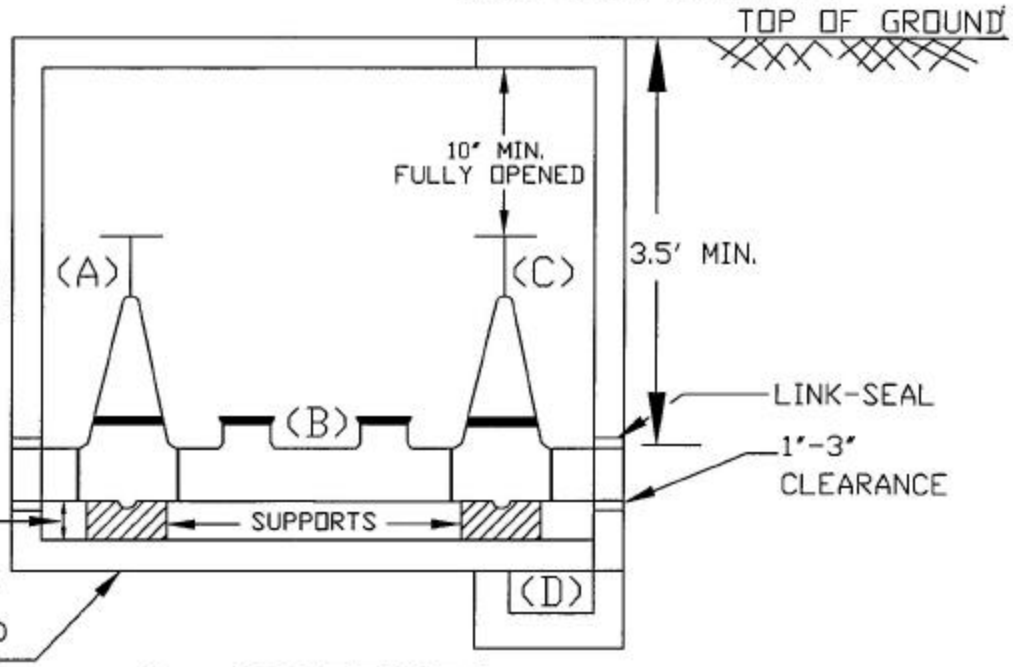


(A) OUTSIDE STEM AND YOKE GATE VALVE
(B) DOUBLE CHECK DEVICE
(C) OUTSIDE STEM AND YOKE GATE VALVE

(D) SUMP PUMP WHERE WATER TABLE IS A PROBLEM OR GRAVITY DRAIN WHERE WATER TABLE IS NOT

ELEVATION

VAULT SHALL BE AS MANUFACTURED BY CARSON-INDUSTRIES, LTD. (MODEL #NG3048-18) OR APPROVED EQUAL (SIZE NECESSARY TO MEET MINIMUM VAULT STANDARDS).

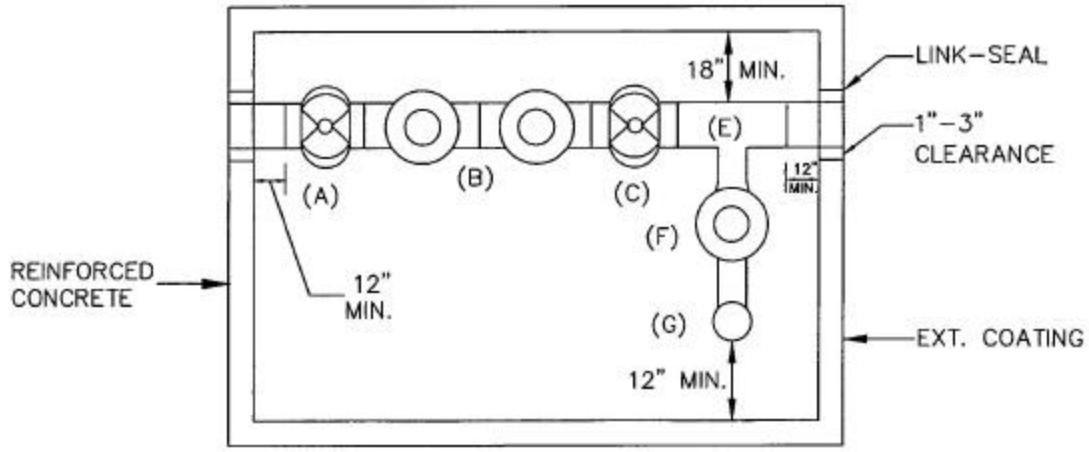


BOX WITH CONCRETE BASE AND DOUBLE CHECK MUST BE SUPPORTED BY POURED IN PLACE CONCRETE PIPE SADDLES OR METAL PIPE STANDS (COATED WITH RUST RETARDANT) COATING.

[>100 FEET]

DATE	2" OR SMALLER DOUBLE CHECK ASSEMBLY AND VAULT	DRWG. NO.
JAN. 1996		FIR-2
REVISIONS JAN. 2003		

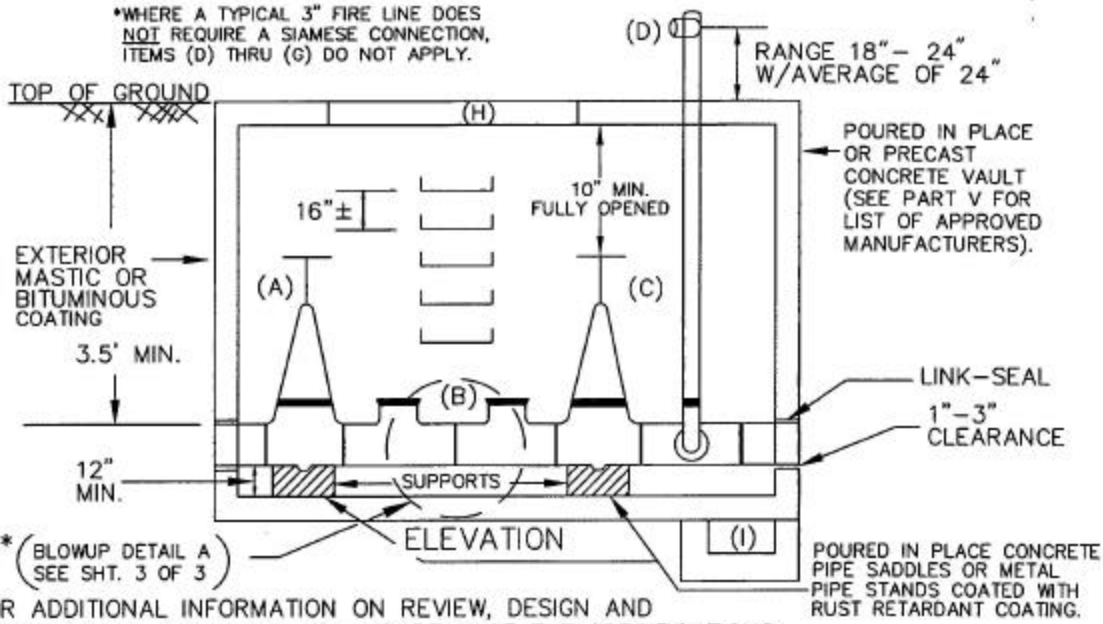
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN

(A) OUTSIDE STEM AND YOKE GATE VALVE
(B) DOUBLE CHECK VALVE ASSEMBLY
(C) OUTSIDE STEM AND YOKE GATE VALVE
* (D) 2 1/2" THREADED N.S.T. SIAMESE CONNECTION FOR FIRE DEPARTMENT W/AUTOMATIC BALL DRIP
* (E) REQUIRED (MAIN LINE SIZE) " X 4"
* (F) 4" CHECK VALVE
* (G) 4" - 90° BEND
(H) JD-2AL 4' X 4' BILCO DOOR, OR AS MANUFACTURED BY VA. SPRINKLER COMPANY, OR APPROVED EQUAL.
(I) SUMP WHERE WATER TABLE IS A PROBLEM OR GRAVITY DRAIN WHERE WATER TABLE IS NOT A PROBLEM.
** (J) BYPASS LINE W/DETECTOR METER & BACKFLOW PREVENTER

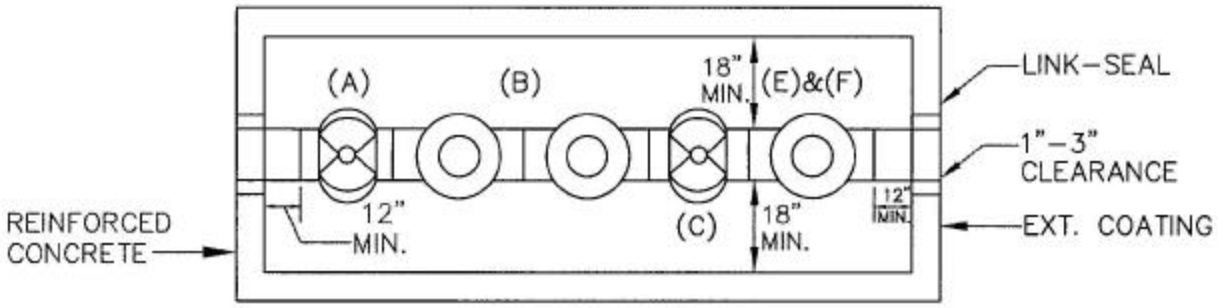
*WHERE A TYPICAL 3" FIRE LINE DOES NOT REQUIRE A SIAMESE CONNECTION, ITEMS (D) THRU (G) DO NOT APPLY.



FOR ADDITIONAL INFORMATION ON REVIEW, DESIGN AND CONSTRUCTION, SEE PART IV, & PART V OF THE SPECIFICATIONS.

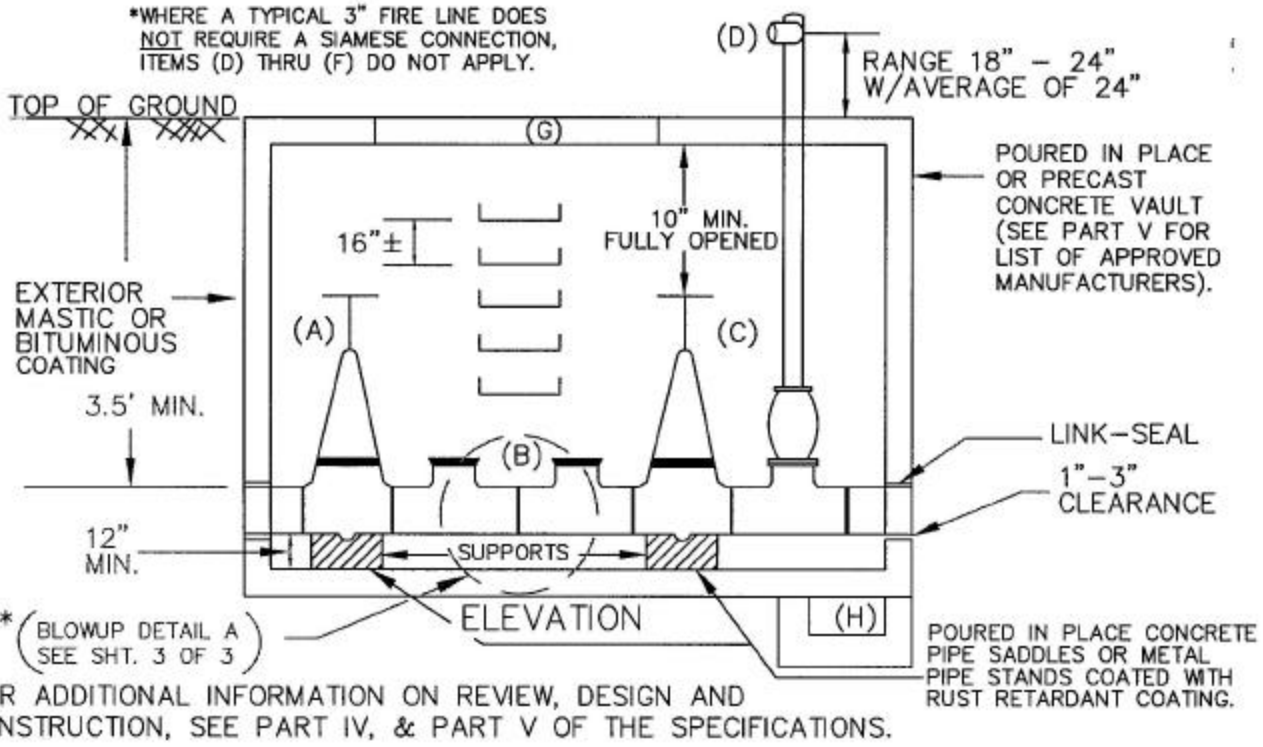
DATE: JAN. 1996	3" OR LARGER DOUBLE CHECK ASSEMBLY AND VAULT (Alternate 1)	DRWG. NO. FIR-3 SHT. 1 OF 3
REVISIONS: DEC. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN

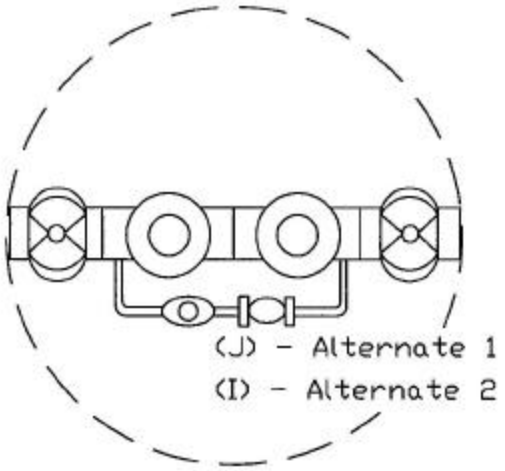
(A) OUTSIDE STEM AND YOKE GATE VALVE
(B) DOUBLE CHECK VALVE ASSEMBLY
(C) OUTSIDE STEM AND YOKE GATE VALVE
* (D) 2 1/2" THREADED N.S.T. SIAMESE CONNECTION FOR FIRE DEPARTMENT W/AUTOMATIC BALL DRIP
* (E) REQUIRED (MAIN LINE SIZE) " X 4"
* (F) 4" FIRE PROTECTION CHECK VALVE – Fig. 590F AS MANUFACTURED BY GROOVED SPRINKLER CO. OR APPROVED EQUAL FOR USE IN THIS SPECIFIC APPLICATION.
(G) JD-2AL 4' X 4' BILCO DOOR, OR AS MANUFACTURED BY VA. SPRINKLER COMPANY, OR APPROVED EQUAL.
(H) SUMP WHERE WATER TABLE IS A PROBLEM OR GRAVITY DRAIN WHERE WATER TABLE IS NOT A PROBLEM.
** (I) BYPASS LINE W/DETECTOR METER & BACKFLOW PREVENTER



FOR ADDITIONAL INFORMATION ON REVIEW, DESIGN AND CONSTRUCTION, SEE PART IV, & PART V OF THE SPECIFICATIONS.

DATE: MARCH 2002	3" OR LARGER DOUBLE CHECK ASSEMBLY AND VAULT (Alternate 2)	DRWG. NO. FIR-3
REVISIONS:		SHT. 2 OF 3

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



BLOWUP DETAIL A

USUALLY ON 4" AND LARGER FIRE SUPPRESSION SYSTEMS, THE SIAMESE CONNECTION IS LOCATED INSIDE THE DOUBLE CHECK ASSEMBLY VAULT. UNDER CERTAIN CONDITIONS, THE COUNTY WILL REQUIRE A <u>DOUBLE</u> DETECTOR CHECK ASSEMBLY AS OUTLINED BELOW:

1. WHEN THE ENGINEER IS PROPOSING PRIVATELY MAINTAINED FIRE HYDRANTS TO BE INSTALLED OFF A PRIVATELY MAINTAINED (FIRE SUPPRESSION) WATER LINE,

2. AFTER THOROUGH EVALUATION AND CONSULTATION WITH OTHER COUNTY DEPARTMENTS AND UTILITIES STAFF, THE ENGINEER MAY BE REQUESTED TO SHOW THAT CERTAIN FIRE HYDRANT LINES BE PRIVATELY MAINTAINED RATHER THAN PUBLICLY MAINTAINED, OR

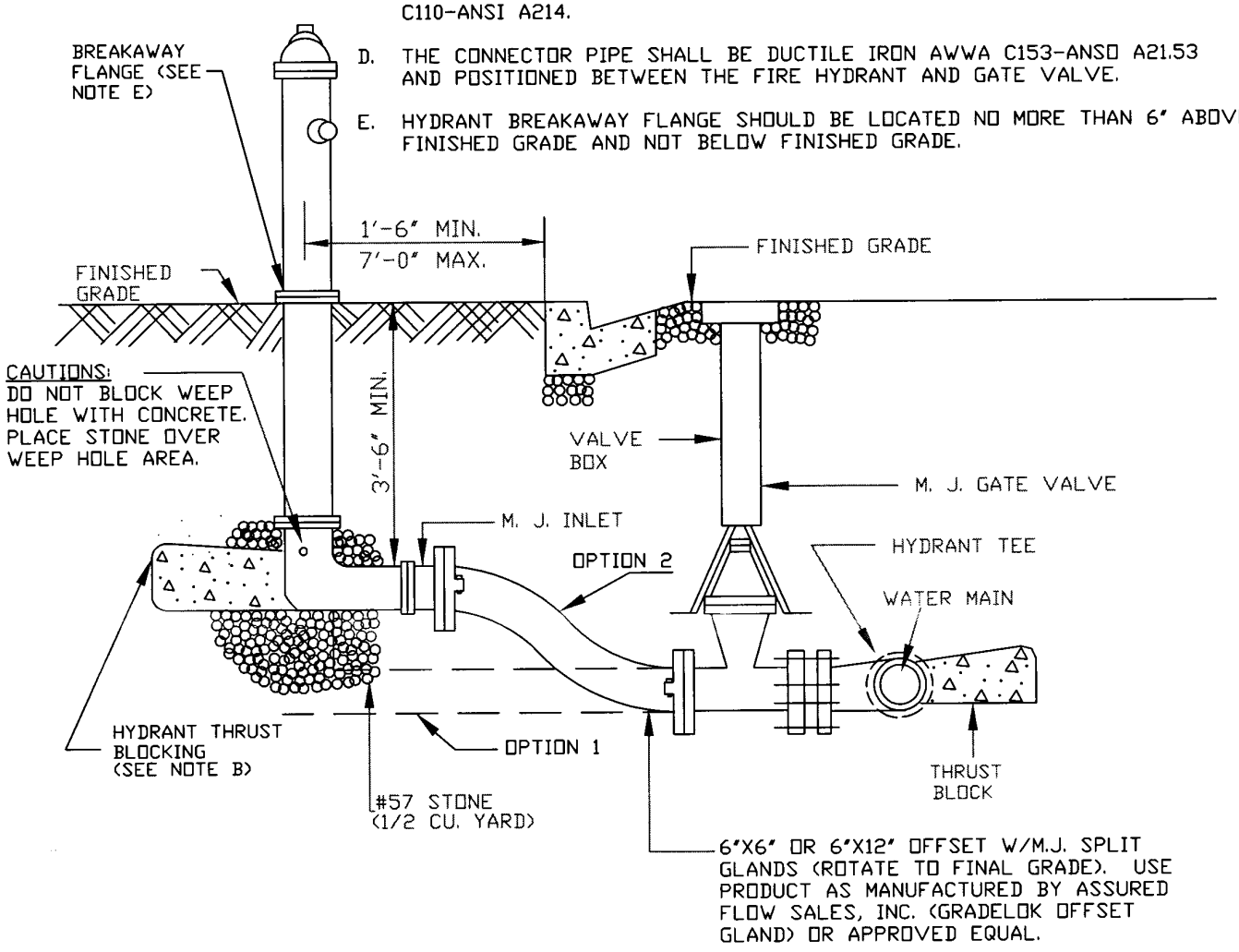
3. UNDER UNUSUAL CIRCUMSTANCES, AND WHEN IT IS DEEMED APPROPRIATE BY COUNTY STAFF THAT A DOUBLE DETECTOR CHECK WOULD BE BENEFICIAL TO THE COUNTY. GENERALLY SPEAKING, THIS WOULD BE A CASE WHERE THERE IS A POTENTIAL FOR ABOVE-AVERAGE WATER LOSS (UNACCOUNTABLE WATER).

DATE: JAN. 1996	GUIDELINES FOR THE USE OF DOUBLE DETECTOR CHECK	DRWG. NO. FIR-3 SHT. 3 OF 3
REVISIONS: MARCH 2002		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

OPTION 1: IF GRADE ADJUSTMENT IS NOT REQUIRED:
- A. CONNECTOR PIPE MAY BE APPROVED D.I. OR P.V.C. PIPE.
- B. IF ALL JOINTS FROM HYDRANT TEE TO HYDRANT ARE RESTRAINED WITH APPROVED JOINT RESTRAINT DEVICE THRUST BLOCKING BEHIND HYDRANT NOT REQUIRED.

OPTION 2: IF GRADE ADJUSTMENT IS REQUIRED:
- A. THE CONNECTOR PIPE SHALL BE OF THE OFFSET DESIGN SO THAT THE FIRE HYDRANT CAN BE ADJUSTED TO ENSURE PLACEMENT AT THE PROPER GRADE. WHEN THE CONNECTOR PIPE IS THE OFFSET DESIGN IT SHALL HAVE AN ANCHORING FEATURE AT BOTH ENDS SO THAT WHEN USED WITH M.J. SPLIT GLANDS A RESTRAINED JOINT IS PROVIDED.
- B. IF ALL JOINTS FROM HYDRANT TEE TO HYDRANT ARE RESTRAINED WITH APPROVED JOINT RESTRAINT DEVICE, THRUST BLOCKING BEHIND HYDRANT NOT REQUIRED.
- C. THE CONNECTOR PIPE SHALL BE CEMENT LINED IN ACCORDANCE WITH AWWA C110-ANSI A214.
- D. THE CONNECTOR PIPE SHALL BE DUCTILE IRON AWWA C153-ANSD A21.53 AND POSITIONED BETWEEN THE FIRE HYDRANT AND GATE VALVE.
- E. HYDRANT BREAKAWAY FLANGE SHOULD BE LOCATED NO MORE THAN 6" ABOVE FINISHED GRADE AND NOT BELOW FINISHED GRADE.



NOTE:

(A). ON ROADWAYS WITHOUT CURB AND GUTTER, VALVE SHOULD BE IN SHOULDER OF ROAD OR BETWEEN PAVEMENT AND DITCH. MINIMUM COVER AT DITCH MUST BE 3'6" OR GREATER.

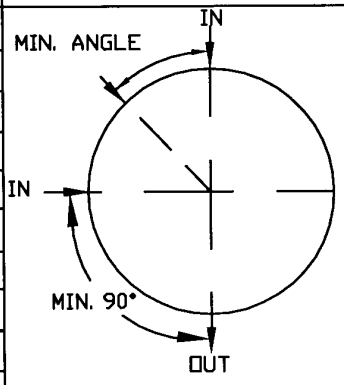
(B). WHEN A HYDRANT TEE IS USED, RESTRAIN JOINT NOT NEEDED TO RESTRAIN VALVE TO TEE.

DATE JAN. 1996	TYPICAL FIRE HYDRANT DETAIL	DRWG. NO. FIR-4
REVISIONS OCT. 1997		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

PIPE SIZE

		8	10	12	15	18	21	24	27	30	33	36	42	48	54
48" MH	8	38°	40°												
	10	40°	43°												
	12	43°	45°	48°											
	15	47°	49°	51°	55°										
	18	55°	57°	59°	63°	71°									
	21	59°	61°	64°	67°	76°	80°								
	24	63°	65°	68°	71°	80°	84°	88°							
60" MH	12	34°	36°	38°	41°										
	15	37°	39°	41°	44°										
	18	44°	46°	48°	51°	57°									
	21	47°	49°	51°	54°	61°	64°								
	24	51°	53°	54°	57°	64°	67°	71°							
	27	54°	56°	58°	61°	67°	71°	74°	77°						
	30	57°	59°	61°	64°	71°	74°	77°	81°	84°					
	33	61°	63°	64°	67°	74°	77°	81°	84°	87°	90°				
72" MH	15				37°	42°									
	18				42°	48°									
	21				45°	50°	53°								
	24				48°	53°	56°	59°							
	27				50°	56°	59°	62°	64°						
	30				53°	59°	62°	64°	67°	70°					
	33				56°	62°	64°	67°	70°	73°	76°		②		
	36				59°	64°	67°	70°	73°	76°	78°	81°	87°		
84" MH	18					41°	43°								
	21					43°	46°								
	24					46°	48°	50°							
	27					48°	50°	53°	55°						
	30					50°	53°	55°	58°	60°					
	33					53°	55°	58°	60°	62°	65°				
	36					55°	58°	60°	62°	65°	67°	70°			
	42					60°	62°	65°	67°	70°	72°	74°	79°		
	48					65°	67°	70°	72°	74°	77°	79°	84°	89°	
96" MH	54								67°	69°	71°	73°	78°	82°	86°



THICK-WALL OR NON-FLOAT PIPE MUST BE CALCULATED.

* D=PIPE DIAMETER
W=PIPE WALL THICKNESS

PIPE 18" AND OVER IS ASSUMED TO BE CONCRETE.

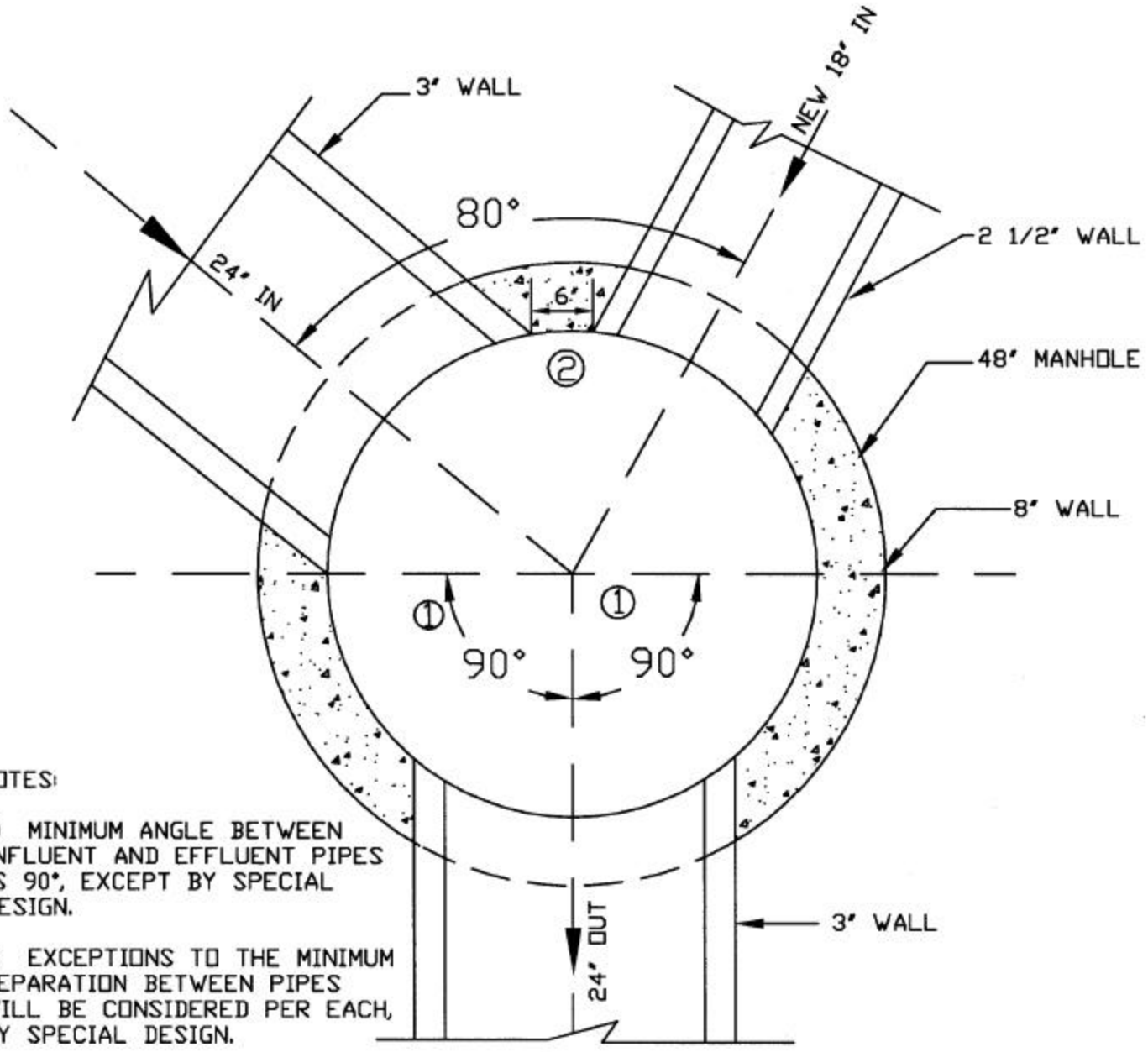
② 42" PIPE WILL BE ALLOWED IN 72" MH WHERE THE CALCULATION ALLOWS IT. FOR EXAMPLE, STRAIGHT THRU OR MIN. ANGLE OVER 92° FOR TWO 42" PIPES.

MINIMUM ANGLE FOR COMBINATIONS NOT GIVEN MAY BE DERIVED BY:

$$\frac{*\frac{D1}{2}+\frac{D2}{2}+(7+W1+W2)}{\pi \text{ MH DIA.}} \times 360$$

DATE JAN. 1996	MANHOLE SIZING AND MINIMUM ANGLE TABLE	DRWG. NO.	MAN-1
REVISIONS		SHT. 1 OF 2	

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTES:

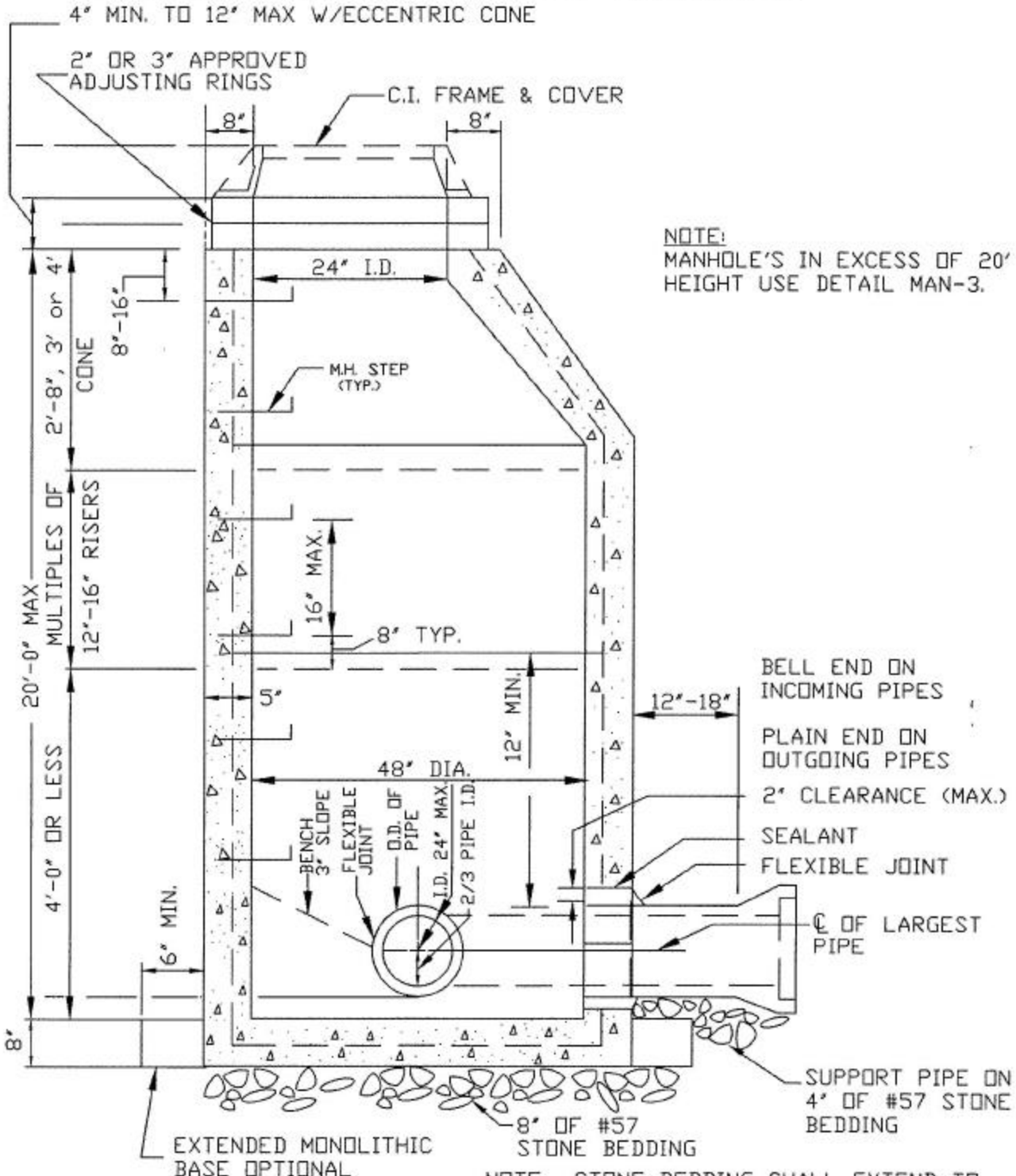
① MINIMUM ANGLE BETWEEN INFLUENT AND EFFLUENT PIPES IS 90°, EXCEPT BY SPECIAL DESIGN.

② EXCEPTIONS TO THE MINIMUM SEPARATION BETWEEN PIPES WILL BE CONSIDERED PER EACH, BY SPECIAL DESIGN.

EXAMPLE: 48" MANHOLE, EXISTING 24" IN, EXISITING 24" OUT, NEW 18" IN, ALL CONCRETE. MAN-1 TABLE INDICATES A MINIMUM ANGLE OF 80° BETWEEN THE EXISTING 24" (IN) AND THE NEW 18" (IN), RESULTING IN APPROXIMATE 6" OF INTERIOR MANHOLE WALL REMAINING BETWEEN THE 2 PIPES.

DATE JAN. 1996	MANHOLE SIZING AND MINIMUM ANGLE TABLE	DRWG. NO. MAN-1 SHT. 2 OF 2
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



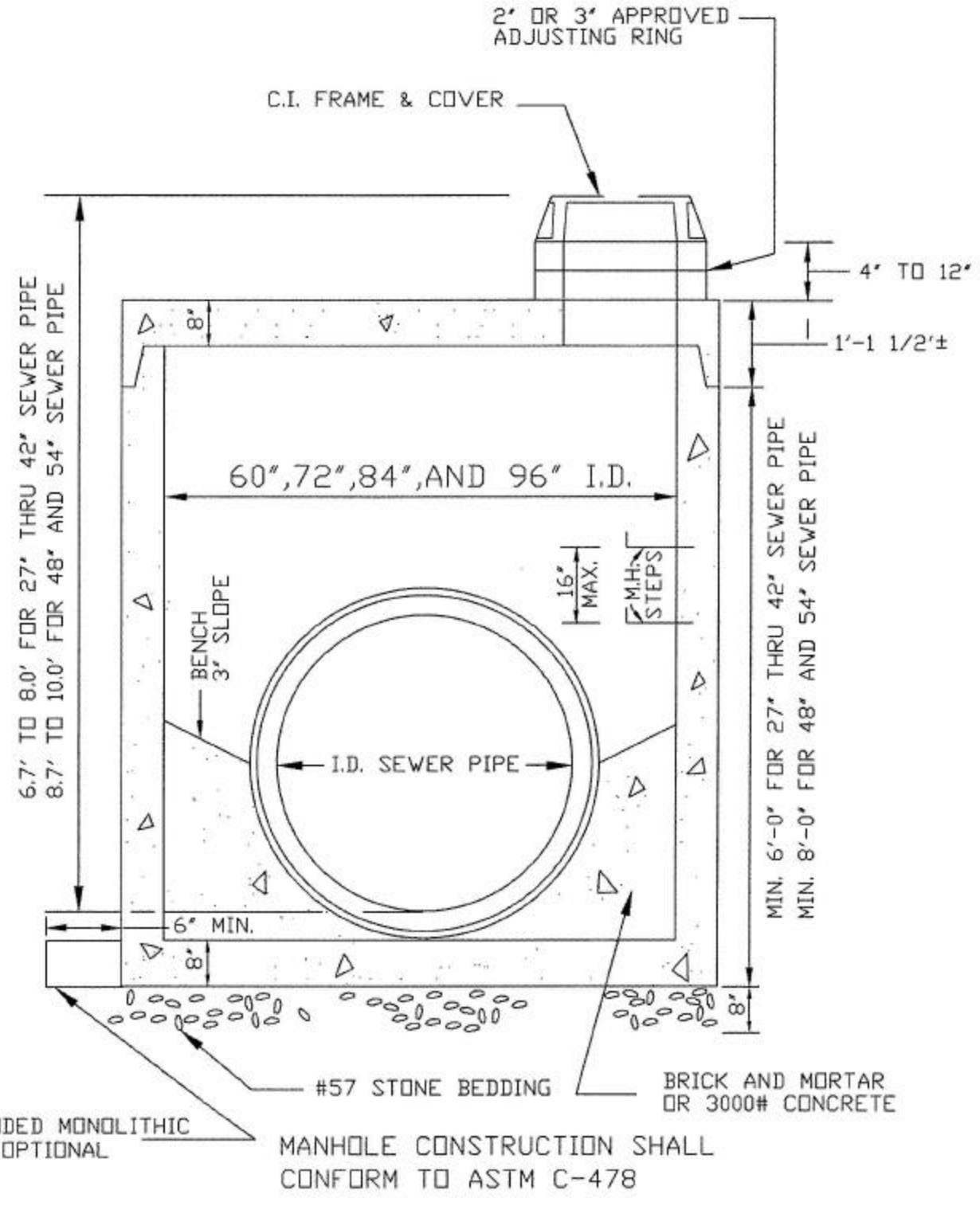
NOTE:
MANHOLE'S IN EXCESS OF 20' HEIGHT USE DETAIL MAN-3.

NOTE: STONE BEDDING SHALL EXTEND TO THE OUTER BOUNDARY OF ALL UNDISTURBED AREAS SURROUNDING THE MANHOLE.

NOTE: BENCH MAY BE CONC. BRICK AND MORTAR.

DATE	STANDARD PRECAST CONCRETE MANHOLE SEWERS 8" TO 24"	DRWG. NO.
JAN. 1996		MAN-2
REVISIONS JAN. 2003		

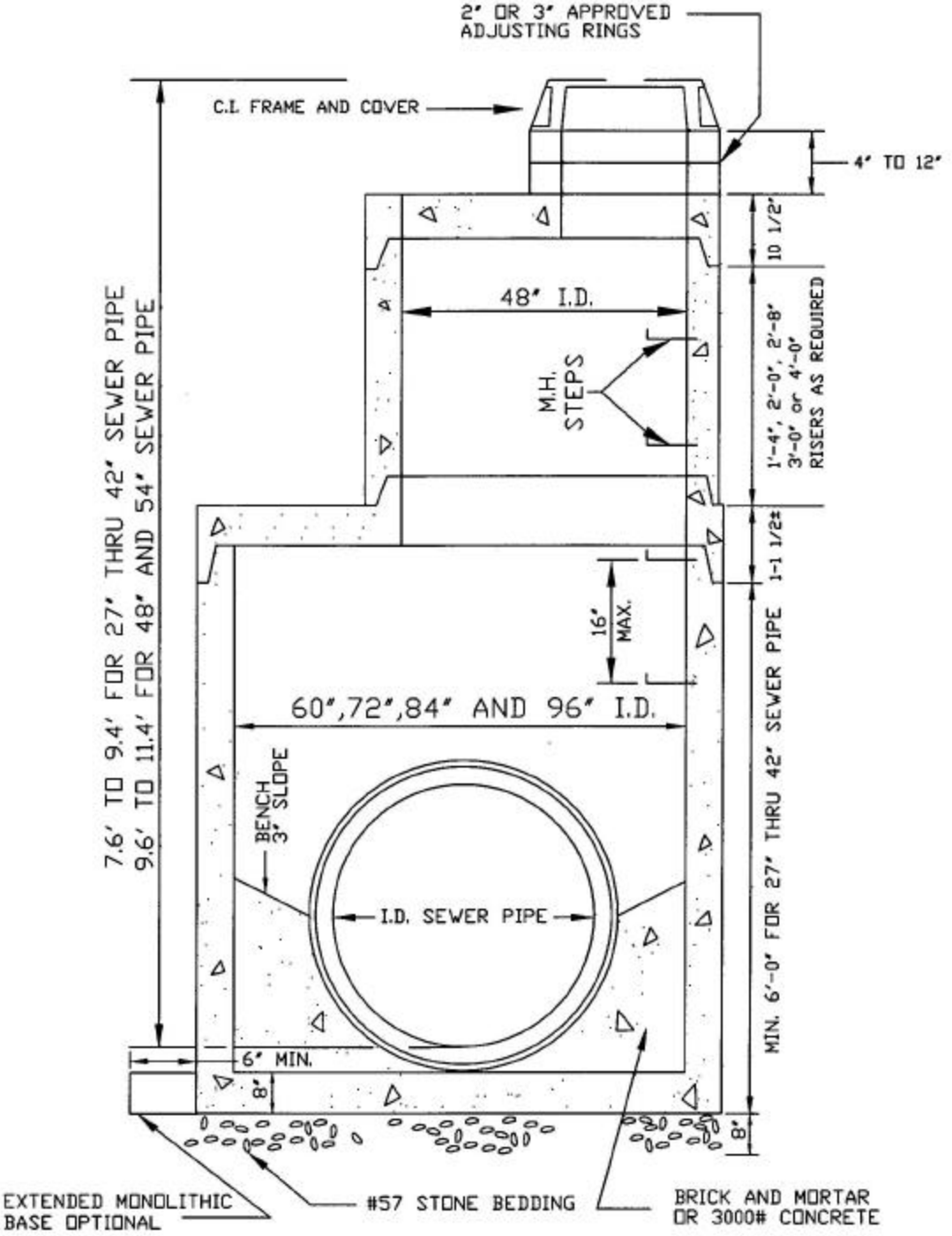
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



MANHOLE CONSTRUCTION SHALL CONFORM TO ASTM C-478

DATE JAN. 1996	60",72", 84" AND 96" I.D. MANHOLE - 1	DRWG. NO. MAN-3
REVISIONS JAN. 2003		

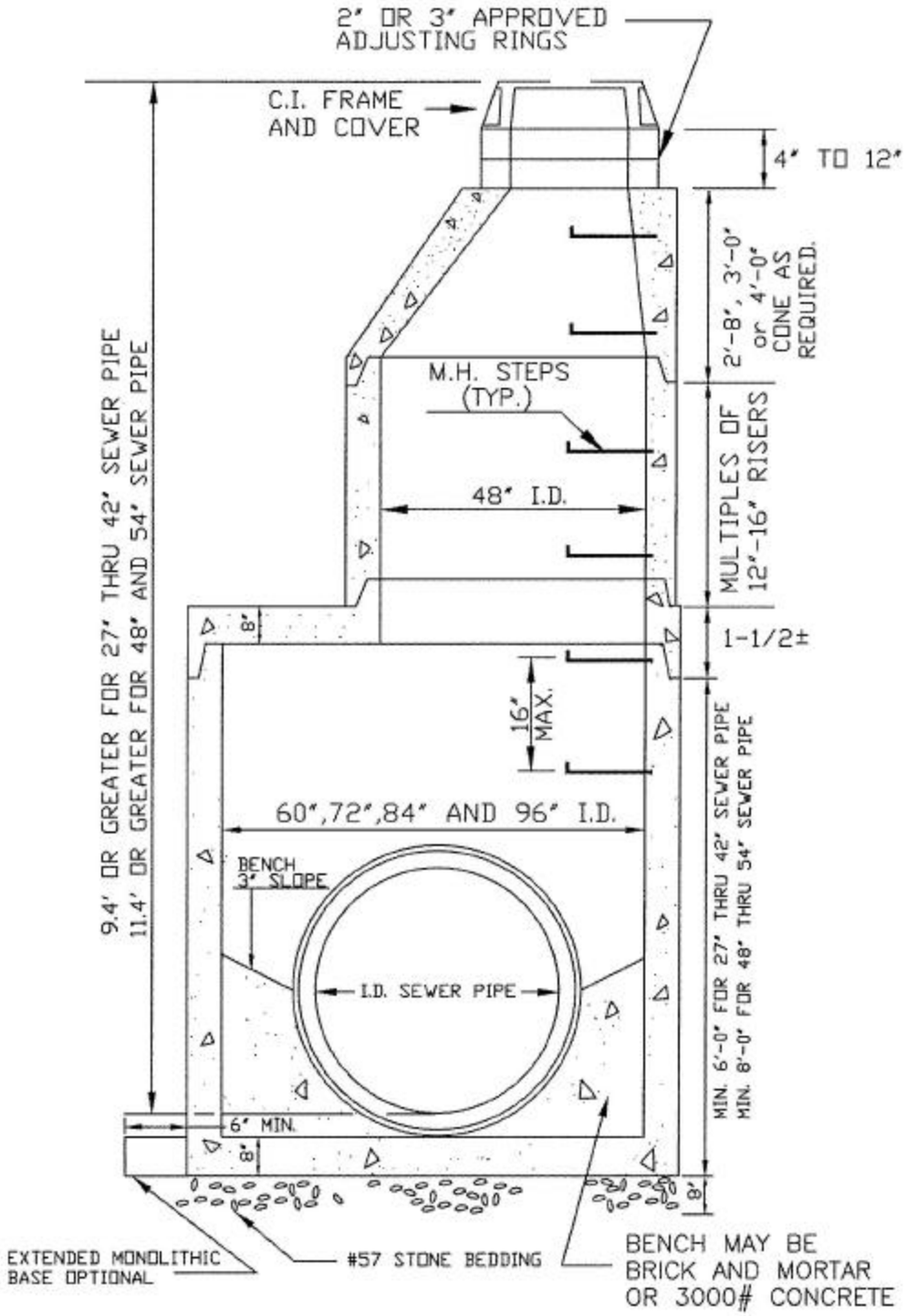
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE: WHERE STUBS ARE PROVIDED FOR FUTURE CONNECTIONS BENCH SHALL BE SO FORMED.

DATE JAN. 1996	60", 72", 84", AND 96" I.D. MANHOLE – II	DRWG. NO. MAN–4
REVISIONS JAN. 2003		

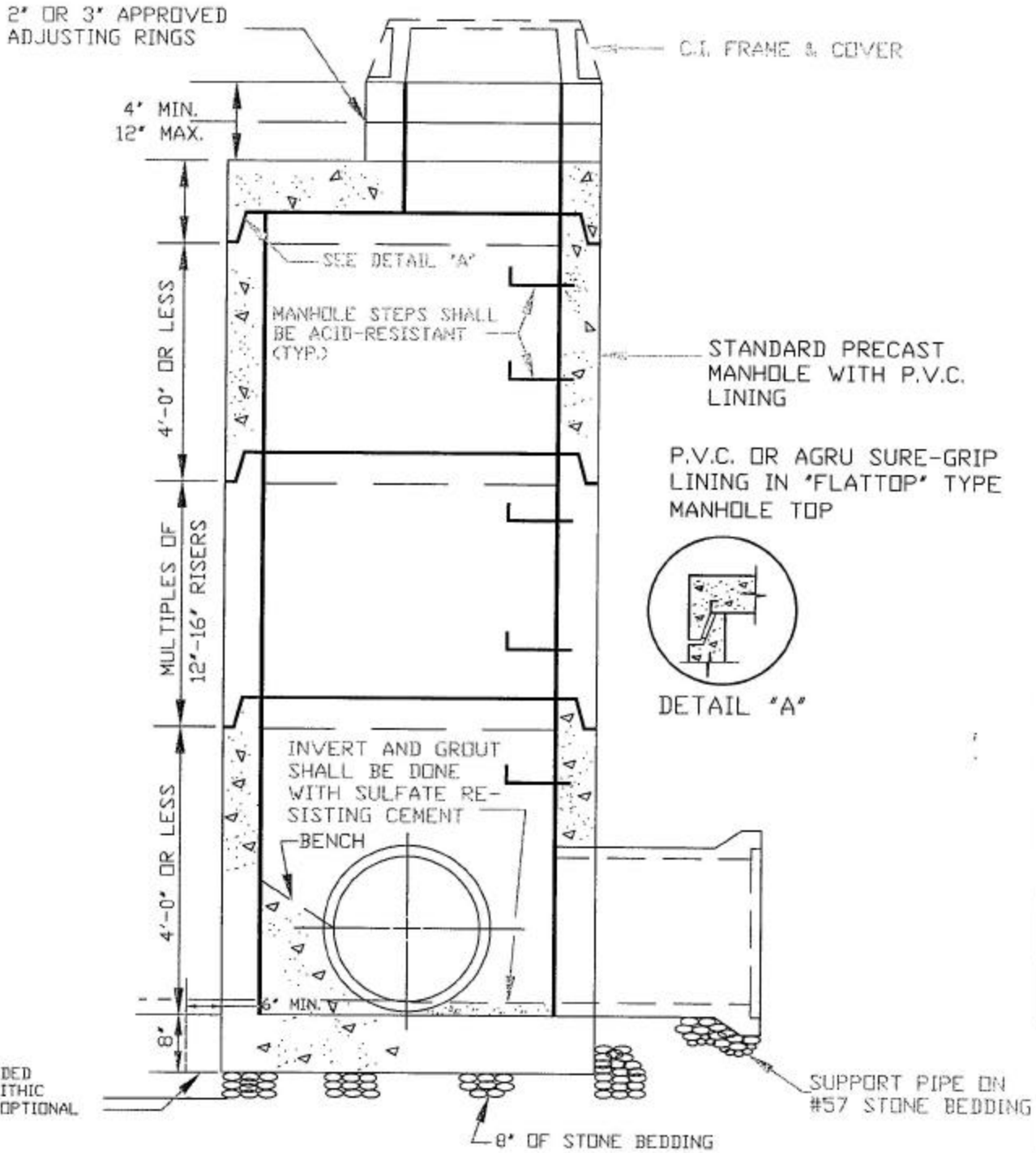
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE: WHERE STUBS ARE PROVIDED FOR FUTURE CONNECTIONS BENCH SHALL BE SO FORMED.

DATE: JAN. 1996	STANDARD PRECAST CONCRETE MANHOLE III 60", 72", 84", AND 96" I.D.	DRWG. NO. MAN-5
REVISIONS: JAN. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE:

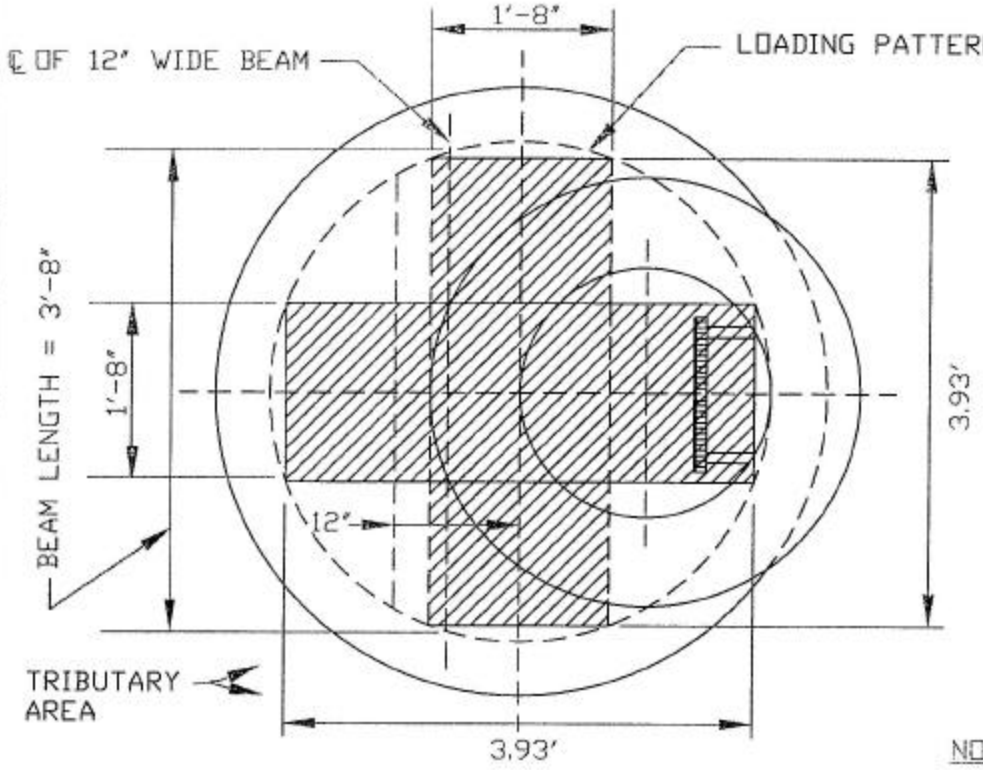
ACID-RESISTANT MANHOLES SHALL BE REQUIRED A MINIMUM OF 1200 FT. DOWNSTREAM OF FORCE MAIN DISCHARGE. CONSULTANTS MUST PROPERLY DESIGN THE SYSTEM THAT THE APPROPRIATE NUMBER OF MANHOLES ARE PROTECTED FROM FUTURE DETERIORATION.

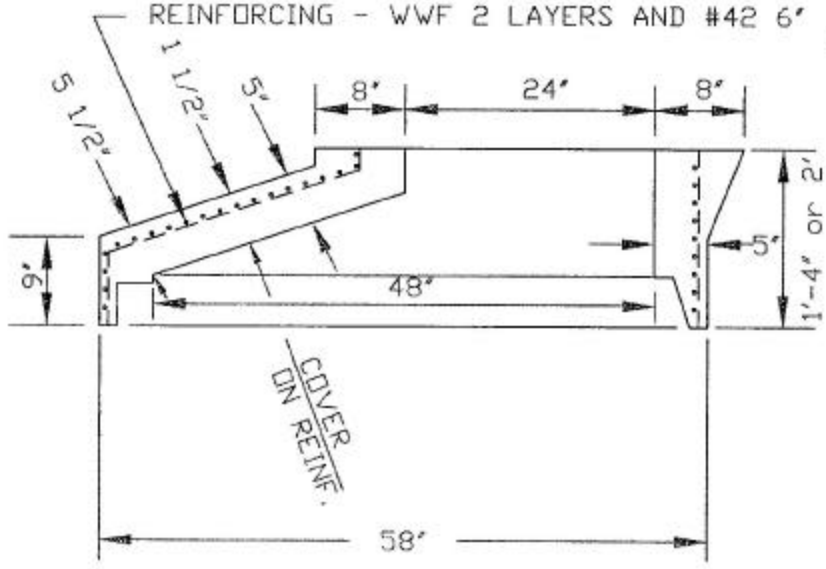
LINING SHALL BE PVC FABRIC EQUAL TO AMERON OR HDPE/PPR AS MANUFACTURED BY AGRU & AMERICAST.

T-LOCK OR AGRU SURE-GRIP JOINTS SHALL BE WELDED ACCORDING TO LINER MANUFACTURER'S RECOMMENDATIONS.

DATE	SPECIAL ACID-RESISTANT LINING ALL MANHOLES	DRWG. NO.
JAN. 1996		MAN-6
REVISIONS JAN. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



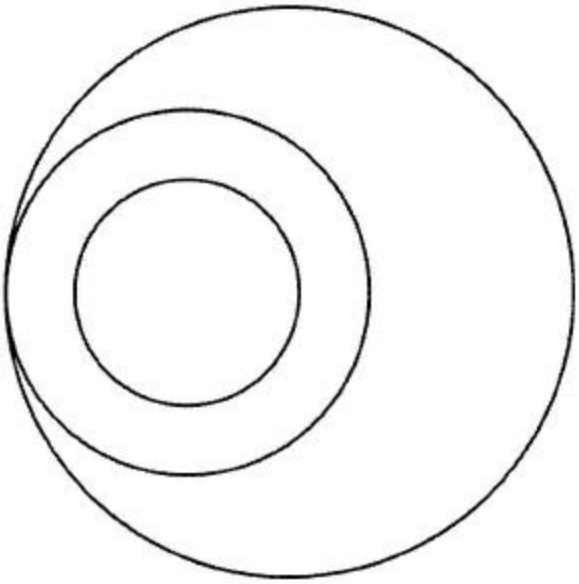


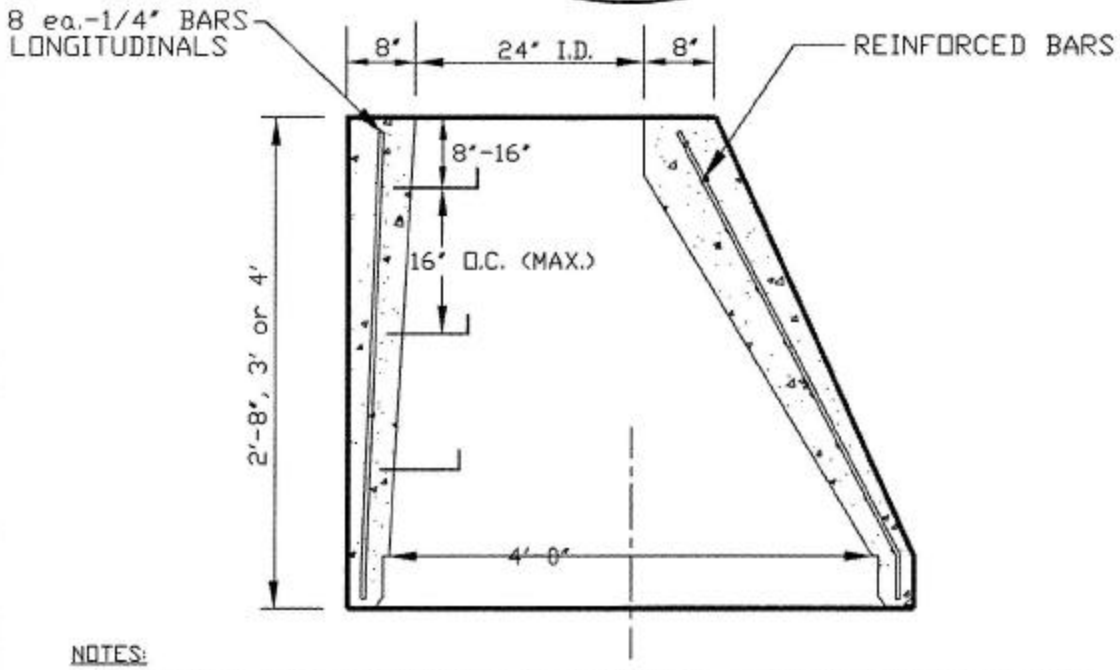
NOTES:

1. REINFORCING TO MEET ASTM A-185 FOR MESH AND ASTM A-615 FOR REBARS.
2. MANHOLE MEETS ALL REQUIREMENTS OF ASTM C-478
3. CONCRETE IS 4000 PSI COMPRESSIVE STRENGTH MINIMUM

DATE		DRWG. NO.
JAN. 1996	1'-4" or 2' CONE (TYPE 1)	MAN-7
REVISIONS JAN. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



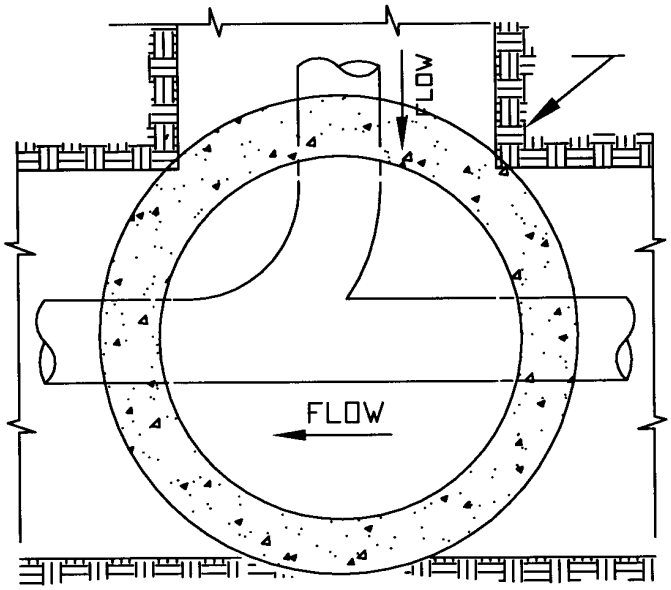


NOTES:

1. CONE SHALL MEET REQUIREMENTS OF ASTM C-478. O-RING GASKET JOINTS MEET REQUIREMENTS OF ASTM C443.
2. CONCRETE SHALL MEET OR EXCEED THE TEST 4000 PSI MINIMUM COMPRESSIVE 28 DAY STRENGTH.
3. APPROVED STEPS SHALL BE EQUAL, SPACED @ 16 INCHES O.C.
4. REINFORCING SHALL BE A MINIMUM .12 IN. ^{2}/FT. (MINIMUM OF 8 EACH - 1/4" BARS ON BACK FACE) & MINIMUM OF 4 EACH - #3 BARS ON FRONT FACE AND W3.4 [5 GAL.] WIRING.)
5. A MAXIMUM OF TWO LIFT HOLES PER SECTION.

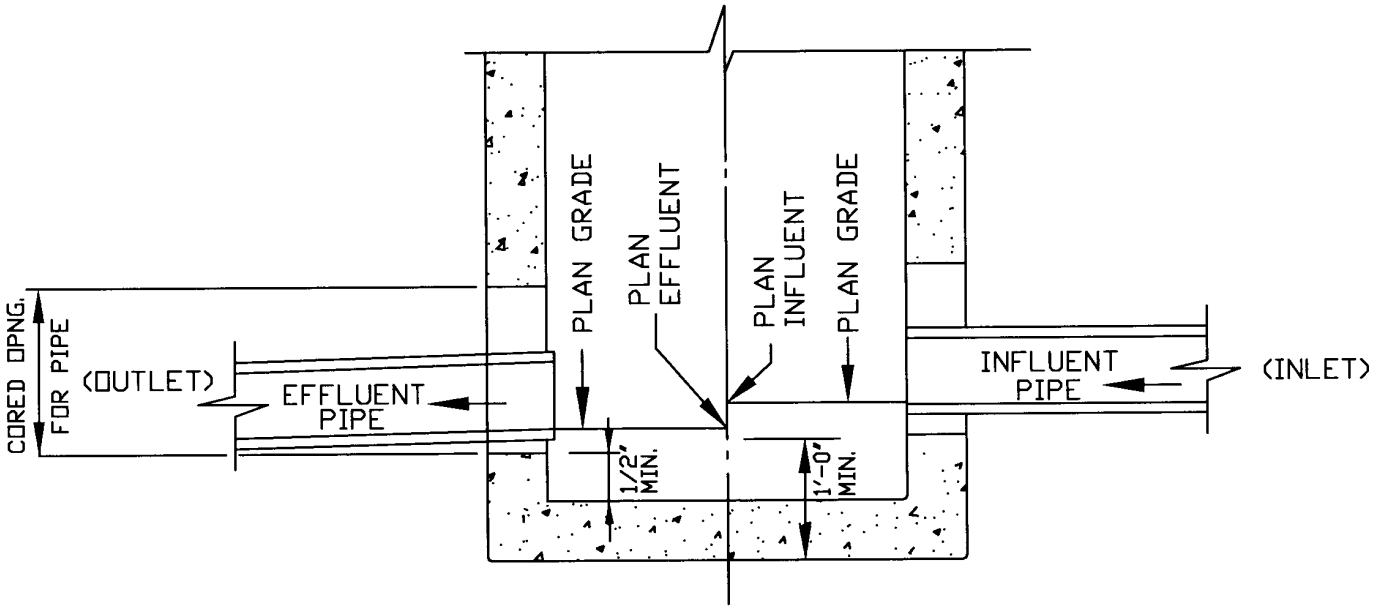
DATE		DRWG. NO.
JAN. 1996	STANDARD ECCENTRIC CONE	MAN-8
REVISIONS JAN. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



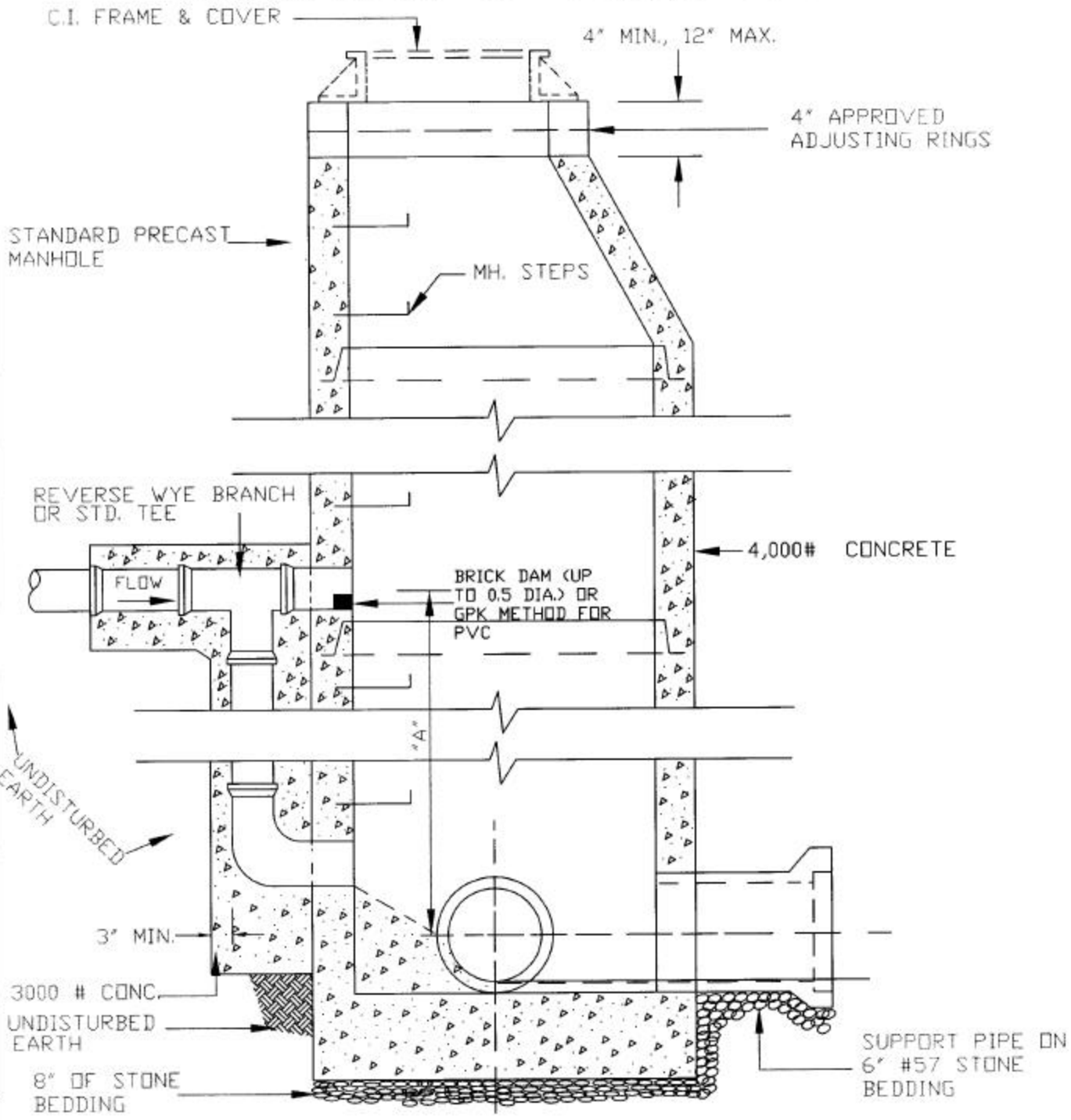
PLAN INVERT

NOTE: THE EFFLUENT ELEVATION SHOWN AT A MANHOLE IS ESTABLISHED FROM THE INFLUENT ELEVATION OF THE MANHOLE IMMEDIATELY DOWNSTREAM. ELEVATIONS SHOWN APPLY AT THE ℄ OF MANHOLES & ARE BASED ON THE HORIZONTAL DISTANCE, ℄ TO ℄ M.H. USING PERCENT OF GRADE INDICATED.



DATE JAN. 1996	STANDARD INVERT DETAILS	DRWG. NO. MAN-9
REVISIONS		

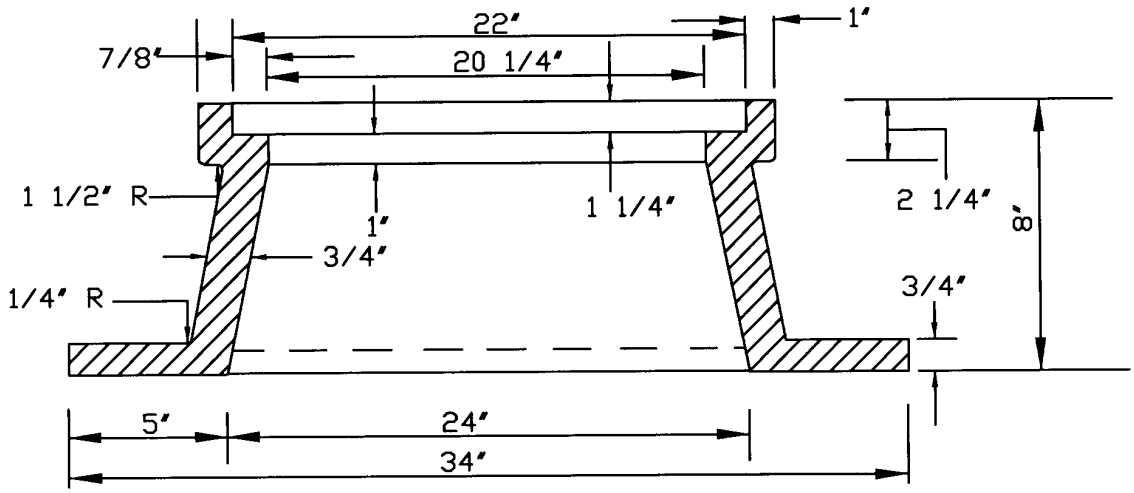
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



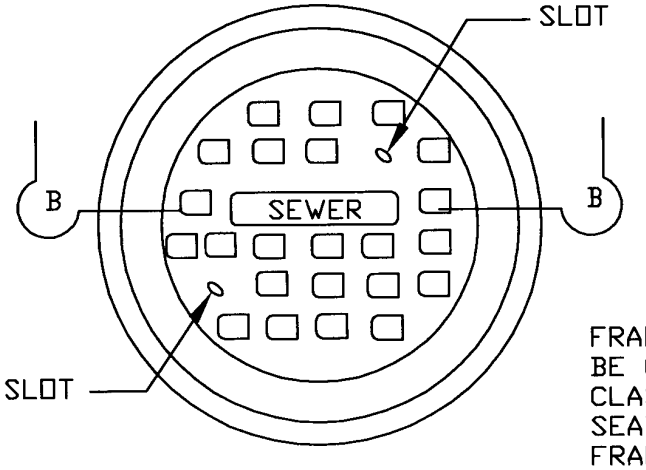
NOTE: WHERE "A" IS GREATER THAN OR EQUAL TO 2'-0" USE STANDARD DROP CONNECTION. CONCRETE ENCASEMENT MAY BE ELIMINATED IF DUCTILE IRON PIPE AND FITTING ARE USED FOR DROP CONNECTION.

DATE		DRWG. NO.
JAN. 1996	STANDARD DROP CONNECTION	MAN-10
REVISIONS JUNE 2000		

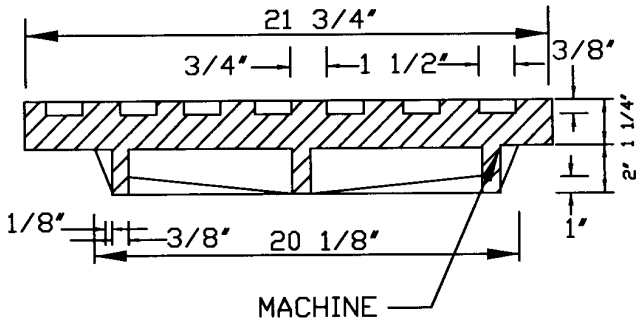
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



FRAME SECTION



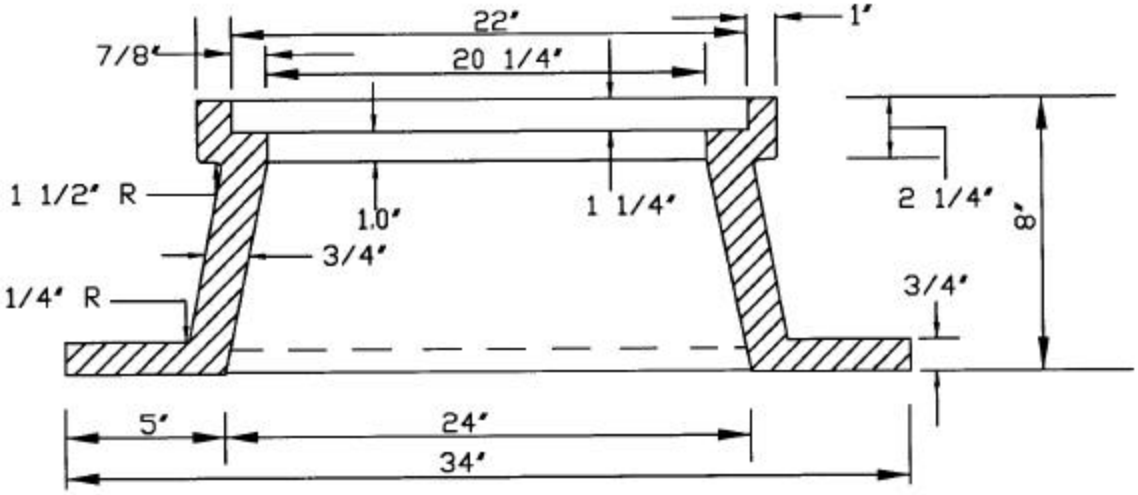
FRAME AND COVER SHALL BE CAST IRON ASTM A-48 CLASS 30
SEATING SURFACE BETWEEN FRAME AND COVER SHALL BE MACHINED.



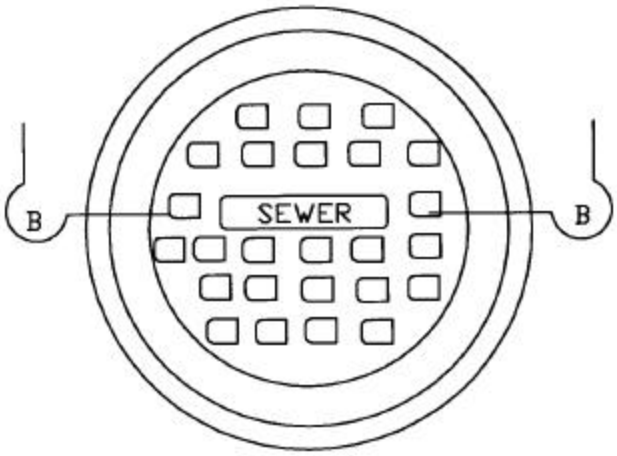
SECT. B-B

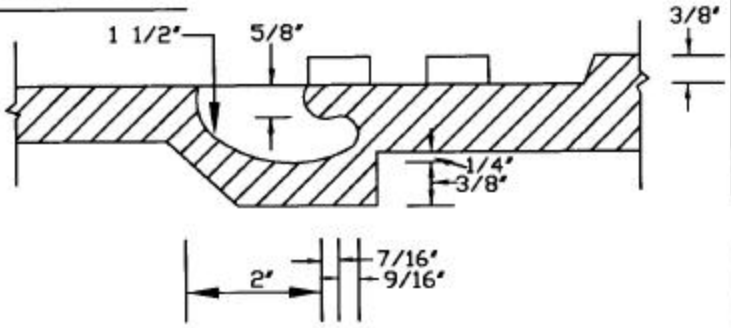
DATE JAN. 1996	STANDARD MANHOLE FRAME & COVER	DRWG. NO. MAN-11
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

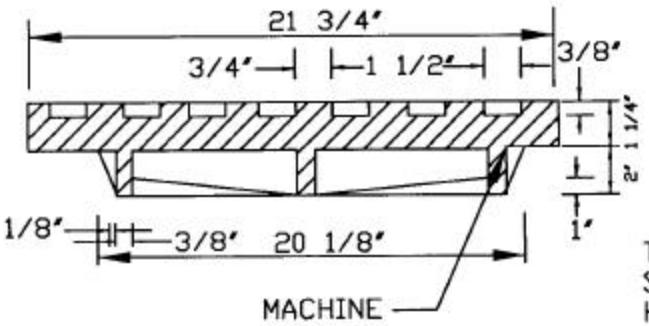


FRAME SECTION

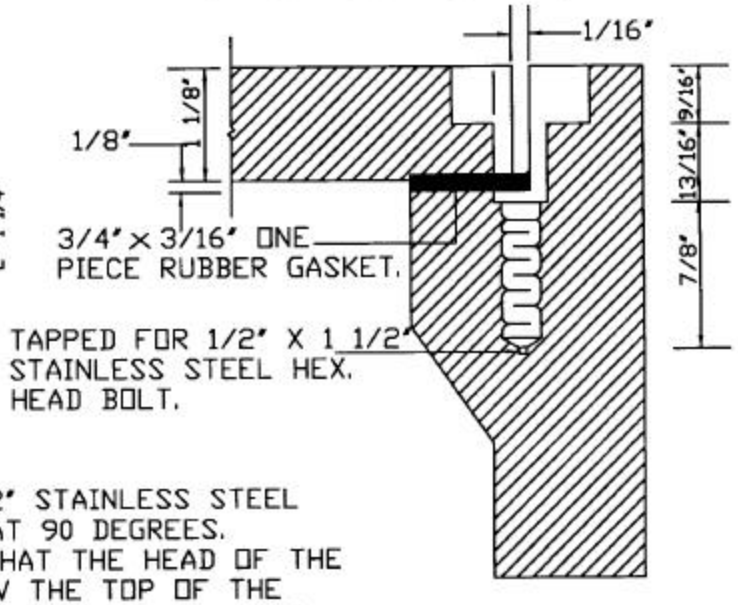




X-SECT. OF PICK HOLE



SECT. B-B

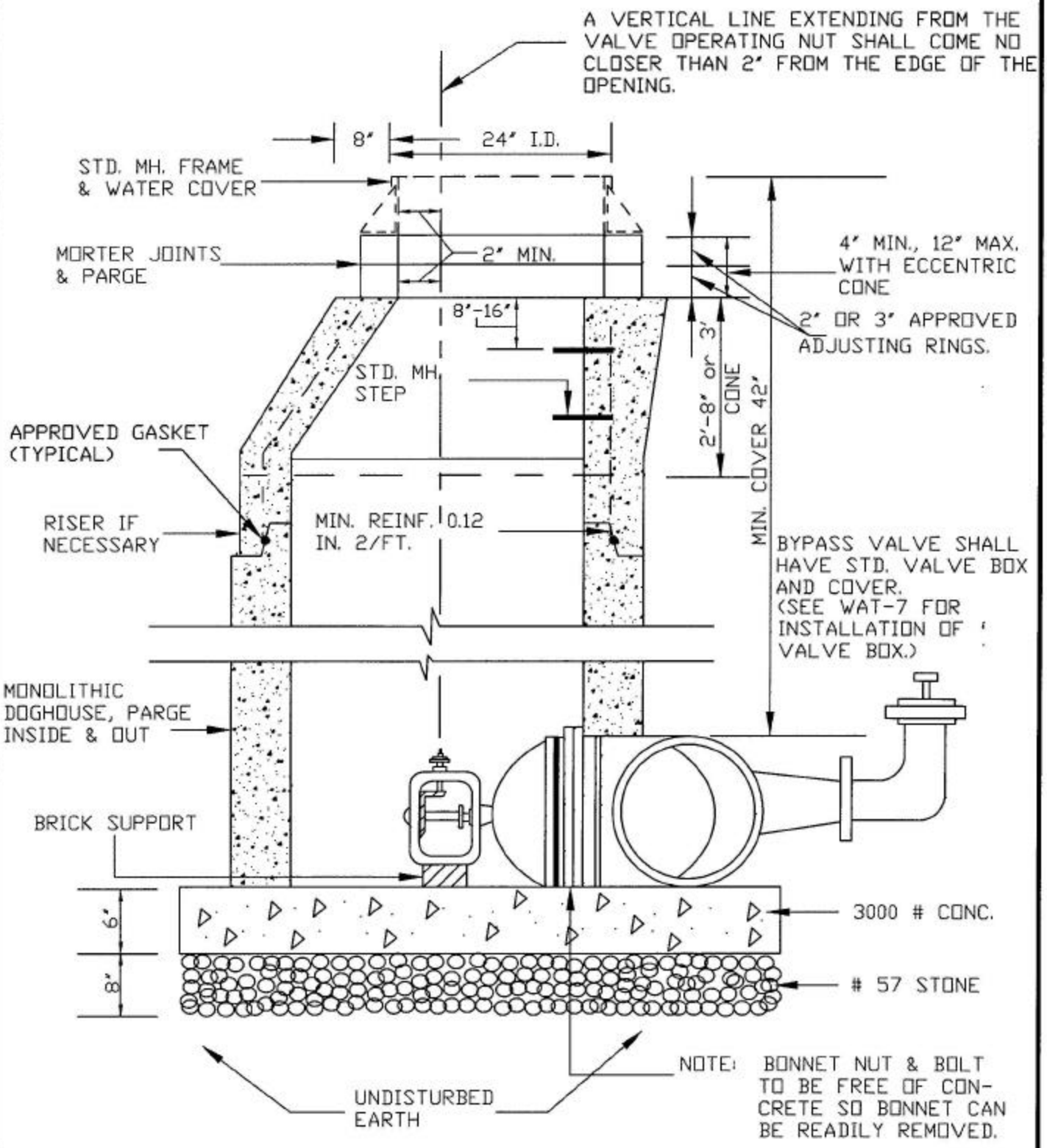


X-SECT. OF BOLT

NOTE: INSTALL (4) FOUR 1/2" X 1 1/2" STAINLESS STEEL 3/4" HEXAGONAL HEAD BOLTS AT 90 DEGREES. COUNTERBORE THE COVER SO THAT THE HEAD OF THE BOLT IS FLUSH OR JUST BELOW THE TOP OF THE COVER. PENTAGON HEAD BOLTS ARE OPTIONAL FOR VANDAL RESISTANT - WATERTIGHT OR NON-WATERTIGHT APPLICATIONS.

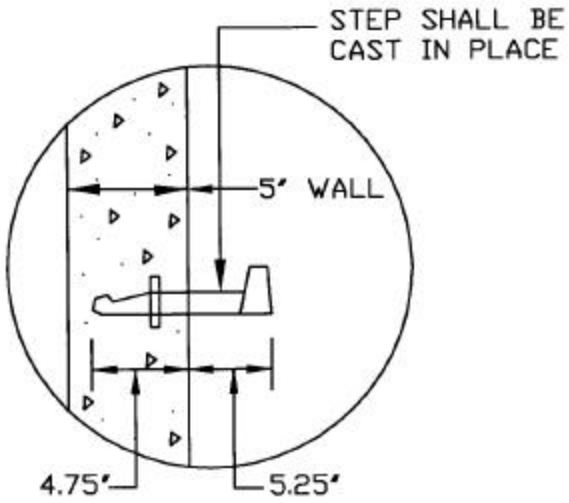
DATE JAN. 1996	WATERTIGHT MANHOLE FRAME & COVER	DRWG. NO. MAN-12
REVISIONS		

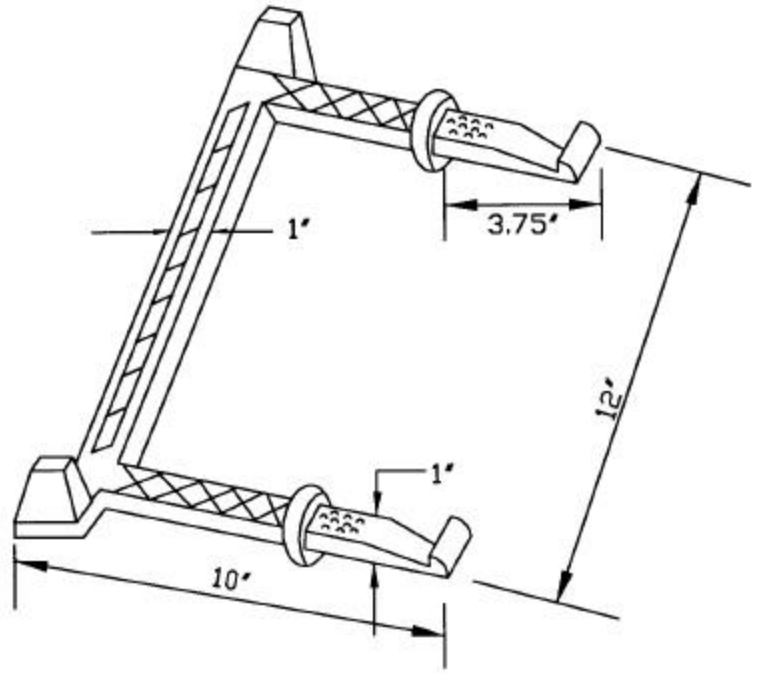
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



DATE	STANDARD VALVE MANHOLE (16" AND LARGER)	DRWG. NO.
JAN. 1996		MAN-13
REVISIONS JAN. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

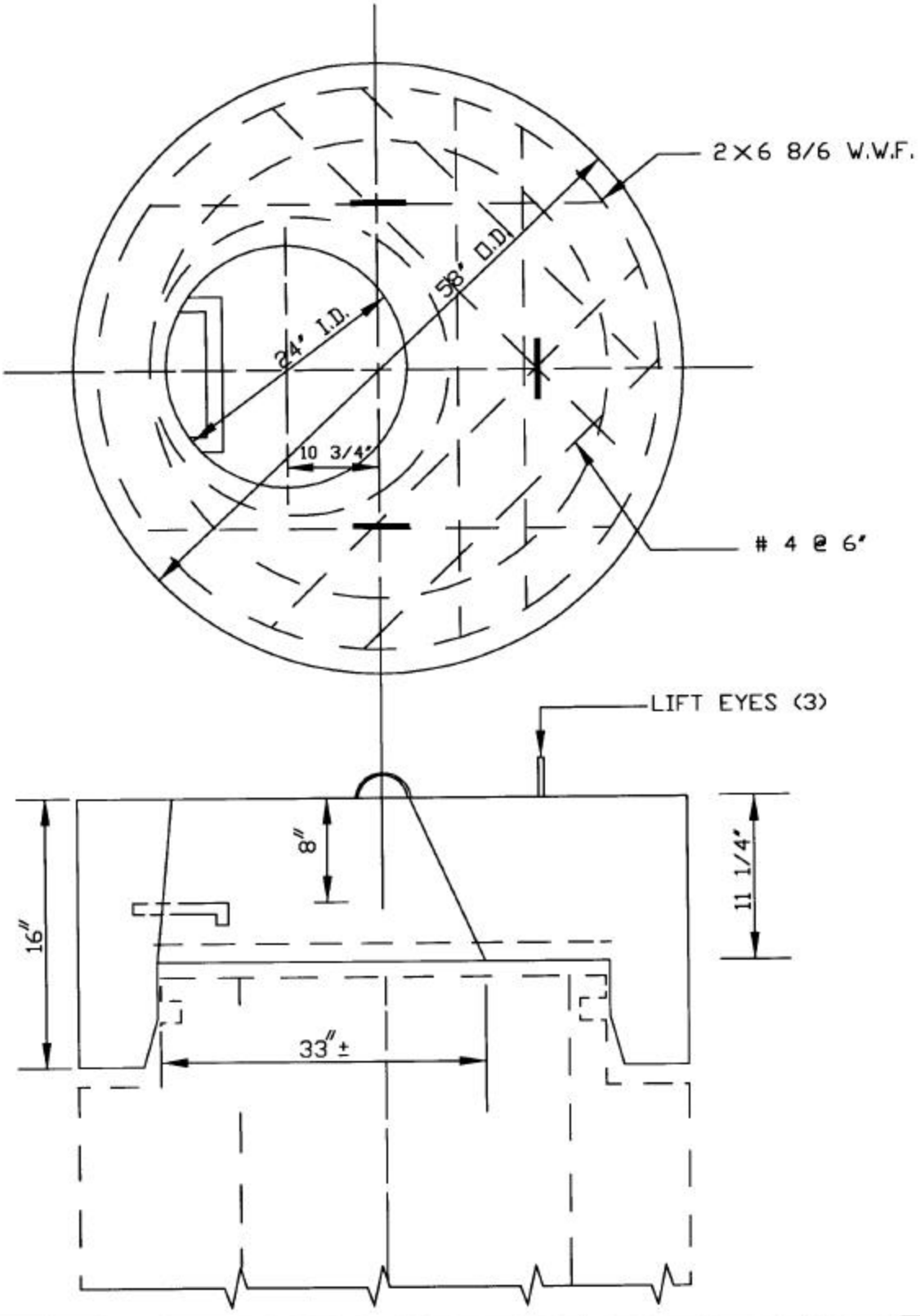




STEP SHALL BE MADE WITH 3/8" STEEL
REINFORCING BAR ENCAPSULATED IN
POLYPROPYLENE PLASTIC.

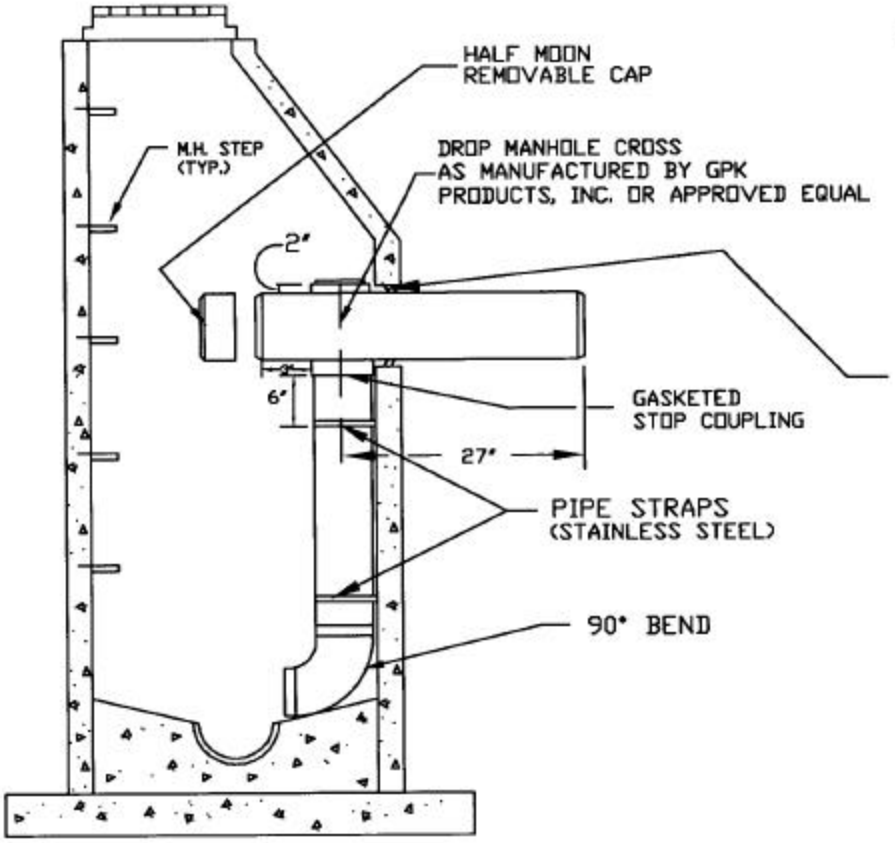
DATE	TYPICAL MANHOLE STEP	DRWG. NO.
JAN. 1996		MAN-14
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



DATE	1′ – 4″ FLAT TOP CONE (TYPE 2)	DRWG. NO.
JAN. 1988		MAN–15
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE: ONLY ONE PER 48" DIAMETER MANHOLE.

USE FLEXIBLE RUBBER BOOT OR APPROVED PVC MANHOLE ADAPTOR AS MANUFACTURED BY GPK PRODUCTS, INC. OR APPROVED EQUAL IN CORE OPENING.

(A) ALL THRU PIPE SHALL BE FITTED WITH AN SDR 35 P.V.C. REMOVABLE CAP WHICH SHALL BE HELD IN PLACE BY THE INTERFERENCE (FRICTION) FIT BETWEEN THE PIPE AND CAP.

(B) ALL CAPS SHALL BE SECURED TO THE DROP FITTING WITH TWO (2) FEET OF GALVANIZED CHAIN SECURED WITH TWO STEEL MACHINE SCREWS, NUTS AND WASHERS.

(C) CHAMFER ON ALL PIPE SIZES TO BE AT A 15 DEGREE ANGLE.

(D) HEIGHT OF VERTICAL STACK WILL BE DETERMINED BY ENGINEER, BUT WILL NOT BE LESS THAN TWO FEET.

(E) DROP STACK TO BE 6" OR 8" SDR 35 P.V.C. PIPE CONNECTED TO DROP FITTING WITH STANDARD GASKETED JOINT.

(F) VERTICAL STACK WILL BE STRAPPED TO MANHOLE AT PIPE JOINTS. STRAPS SHALL BE MADE OF STAINLESS STEEL OR APPROVED MATERIAL NONCORRISIVE TO SEWER GASES.

(G) SHAPE INVERT AS NEEDED TO PROVIDE SMOOTH TRANSITION FROM DROP CONNECTION DISCHARGE POINT TO SPRING LINE OF MANHOLE INVERT.

(H) ELBOW AT BOTTOM OF THE STACK WILL BE A 90 DEGREE BEND POSITIONED IN THE DIRECTION OF THE FLOW IN MANHOLE WITH BENCH CONSTRUCTED TO CONFORM TO MANHOLE BENCH.

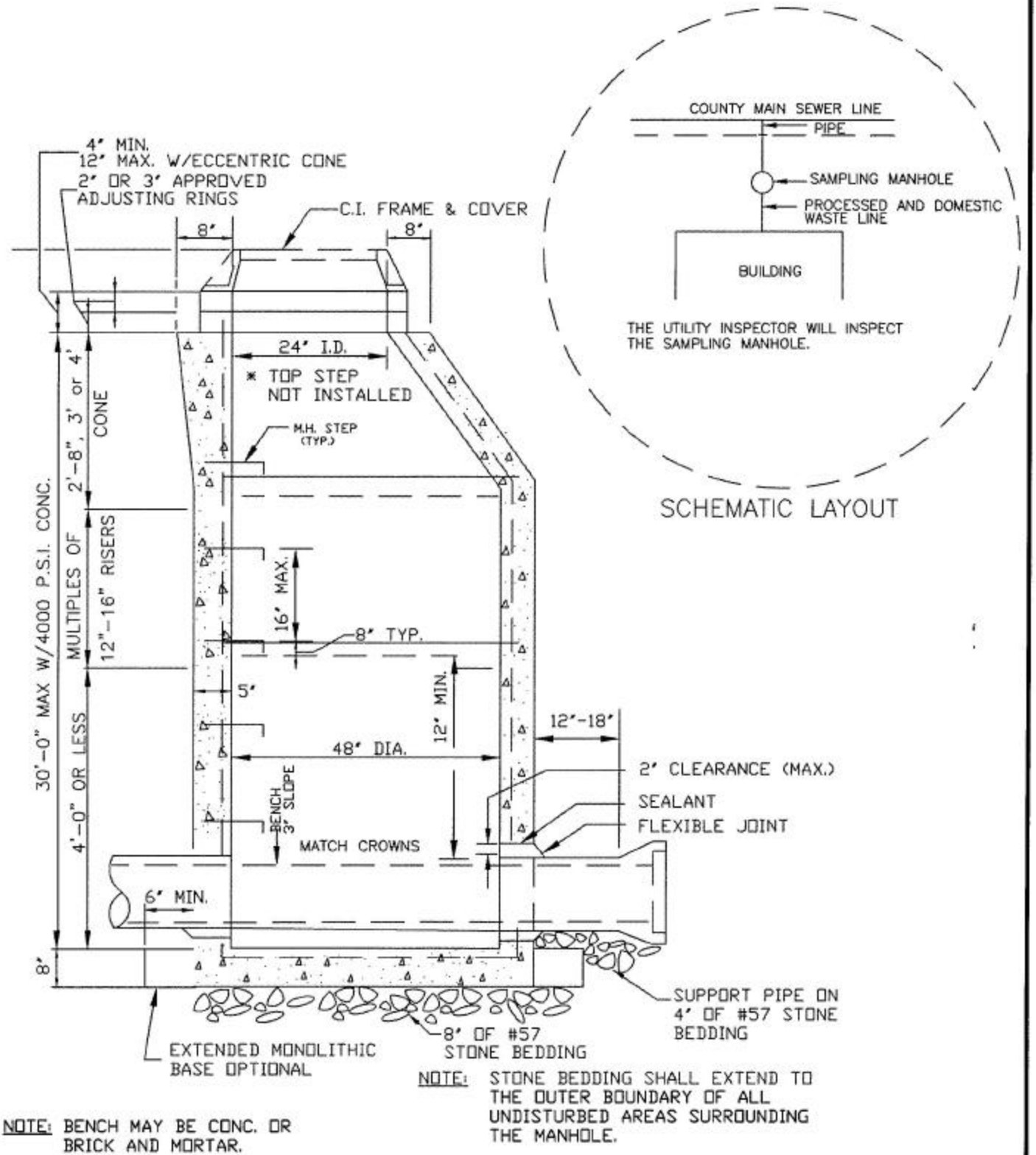
(I) MANHOLE OPENING TO BE CORED AS DESCRIBED IN PART III AND PART IV OF THE LATEST COUNTY WATER AND SEWER SPECIFICATIONS.

(J) DROP STACK SHALL NOT BE INSTALLED WITHIN 60 DEGREES OF THE ACCESS STEPS.

(K) INSIDE DROP CONNECTIONS MAY BE USED AS AN ALTERNATIVE TO EXTERIOR DROP CONNECTIONS UNDER SPECIAL CIRCUMSTANCES, IE. BAD SOILS, HIGH WATER TABLE, UTILITY CONFLICTS, AND EXCESSIVE DEPTHS.

DATE		DRWG. NO.
JAN. 1996	STANDARD DROP CONNECTION (INSIDE)	MAN-16
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



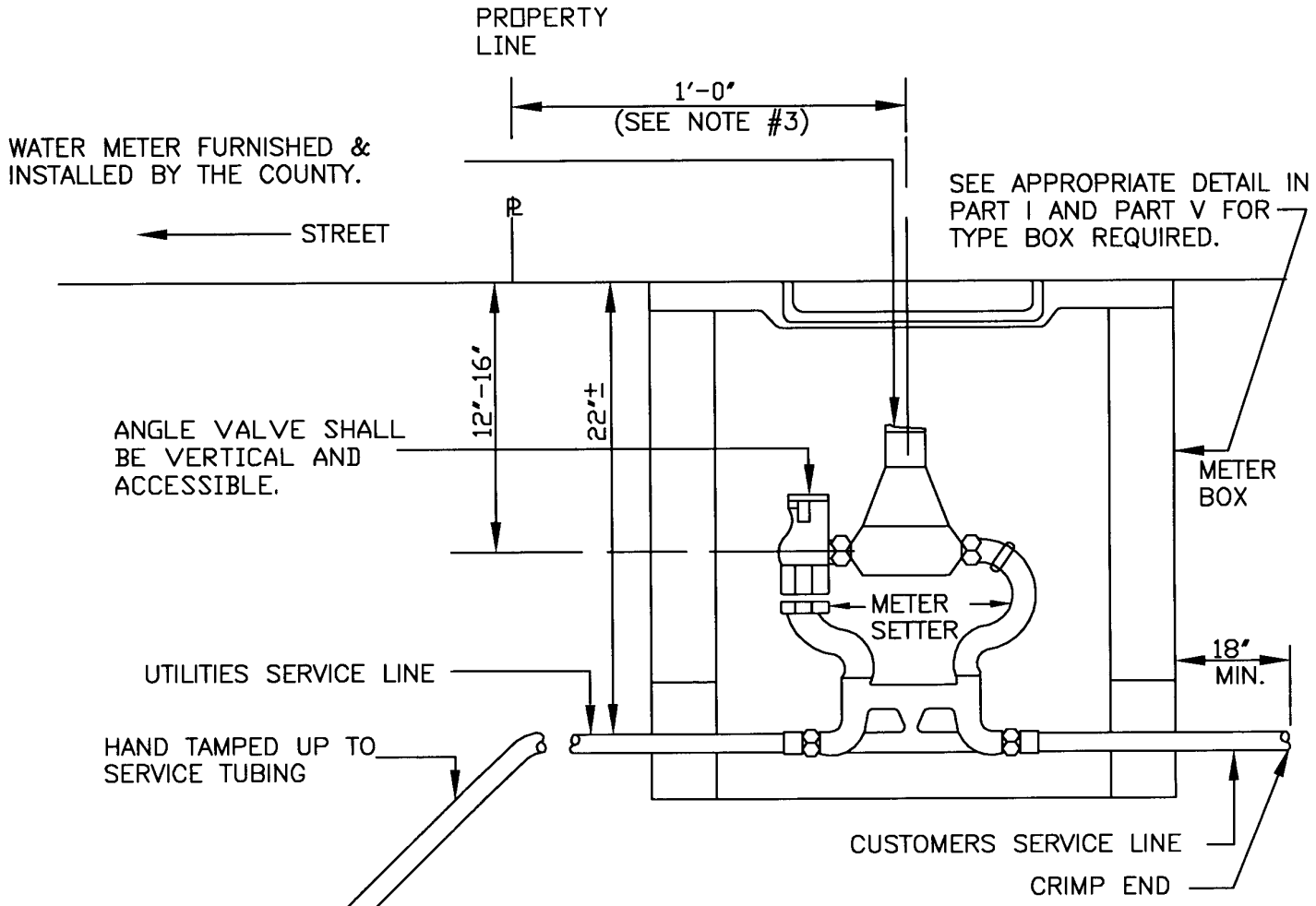
SCHEMATIC LAYOUT

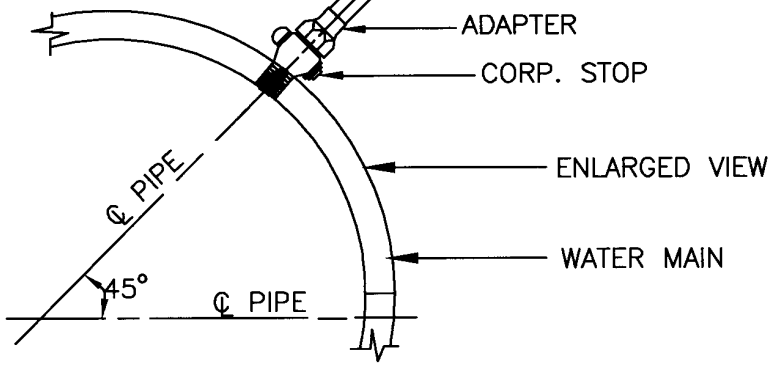
NOTE: BENCH MAY BE CONC. OR BRICK AND MORTAR.

NOTE: STONE BEDDING SHALL EXTEND TO THE OUTER BOUNDARY OF ALL UNDISTURBED AREAS SURROUNDING THE MANHOLE.

DATE		DRWG. NO.
JAN. 1996	SAMPLING MANHOLE	MAN-17
REVISIONS JAN.2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES





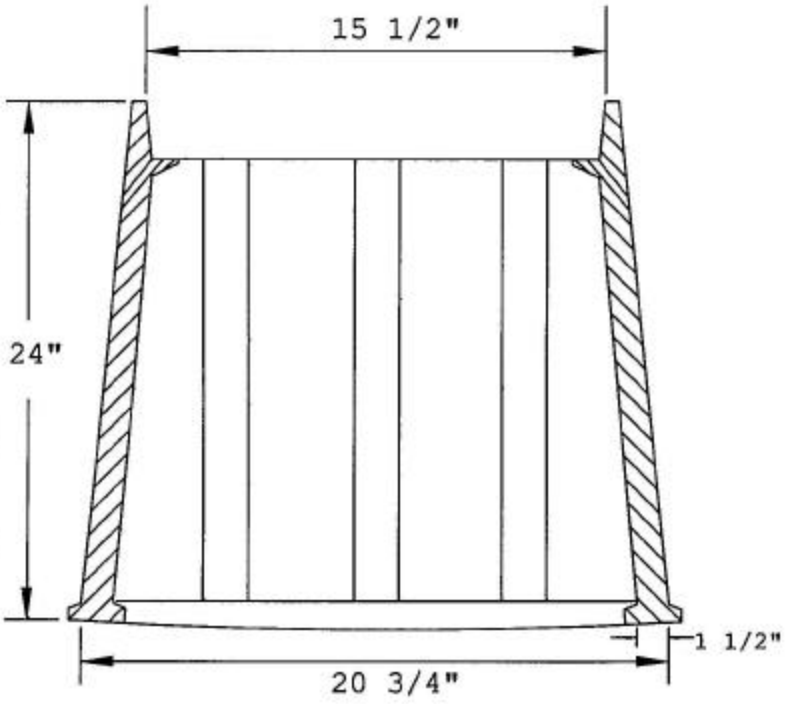
SADDLE MUST BE USED IF TAP IS MADE IN PVC OR A/C PIPE.

NOTES:

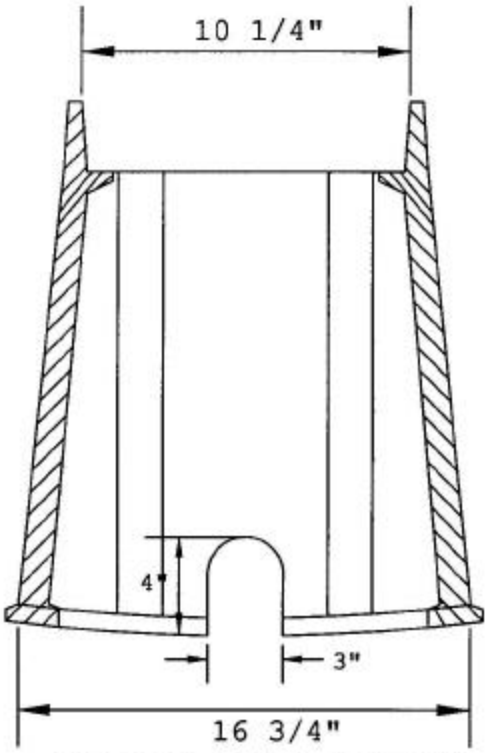
1. METERSETTER SHALL BE CENTERED IN METER BOX AND COPPER TUBING ON OUTLET SIDE OF SETTER SHALL EXTEND 18" OUTSIDE OF BOX ON CUSTOMER'S SIDE. THIS COPPER TUBING SHALL BE CRIMPED ON THE END TO KEEP DIRT FROM ENTERING LINE.
2. COPPER TUBING TO THE CORPORATION STOP MUST BE FLARED OR COMPRESSION.
3. METER BOX SHOULD BE LOCATED 1' INSIDE OF PROPERTY LINE. METER BOX MAY BE MOVED A REASONABLE DISTANCE INSIDE PROPERTY LINE IN ORDER TO INSTALL ON REASONABLY LEVEL GROUND.
4. SERVICES SHALL BE INSTALLED PRIOR TO TESTING.
5. BYPASS SHALL NOT BE ALLOWED FOR 1" RESIDENTIAL AND IRRIGATION METERS.

DATE	TYPICAL WATER METER CONNECTION FOR 3/4" & 1" SERVICES (5/8" AND 1" METERS)	DRWG. NO.
JAN. 1996		MET-1
REVISIONS		

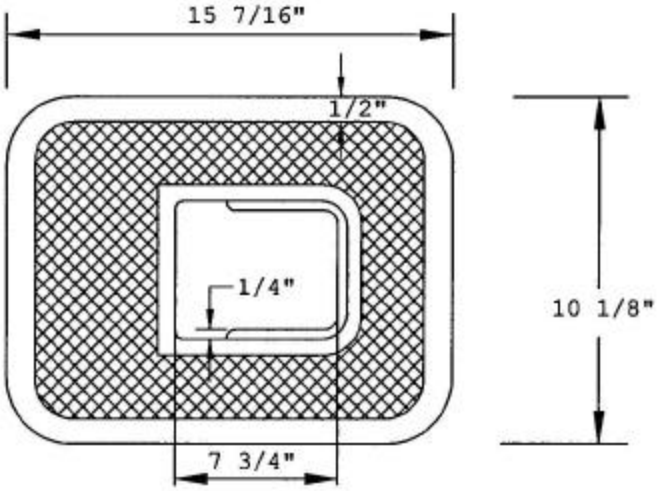
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



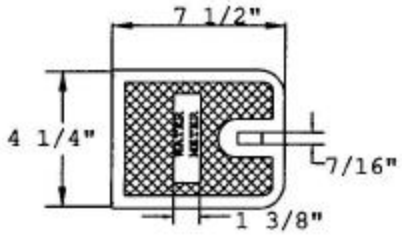
LONG SIDE VIEW



SHORT SIDE VIEW



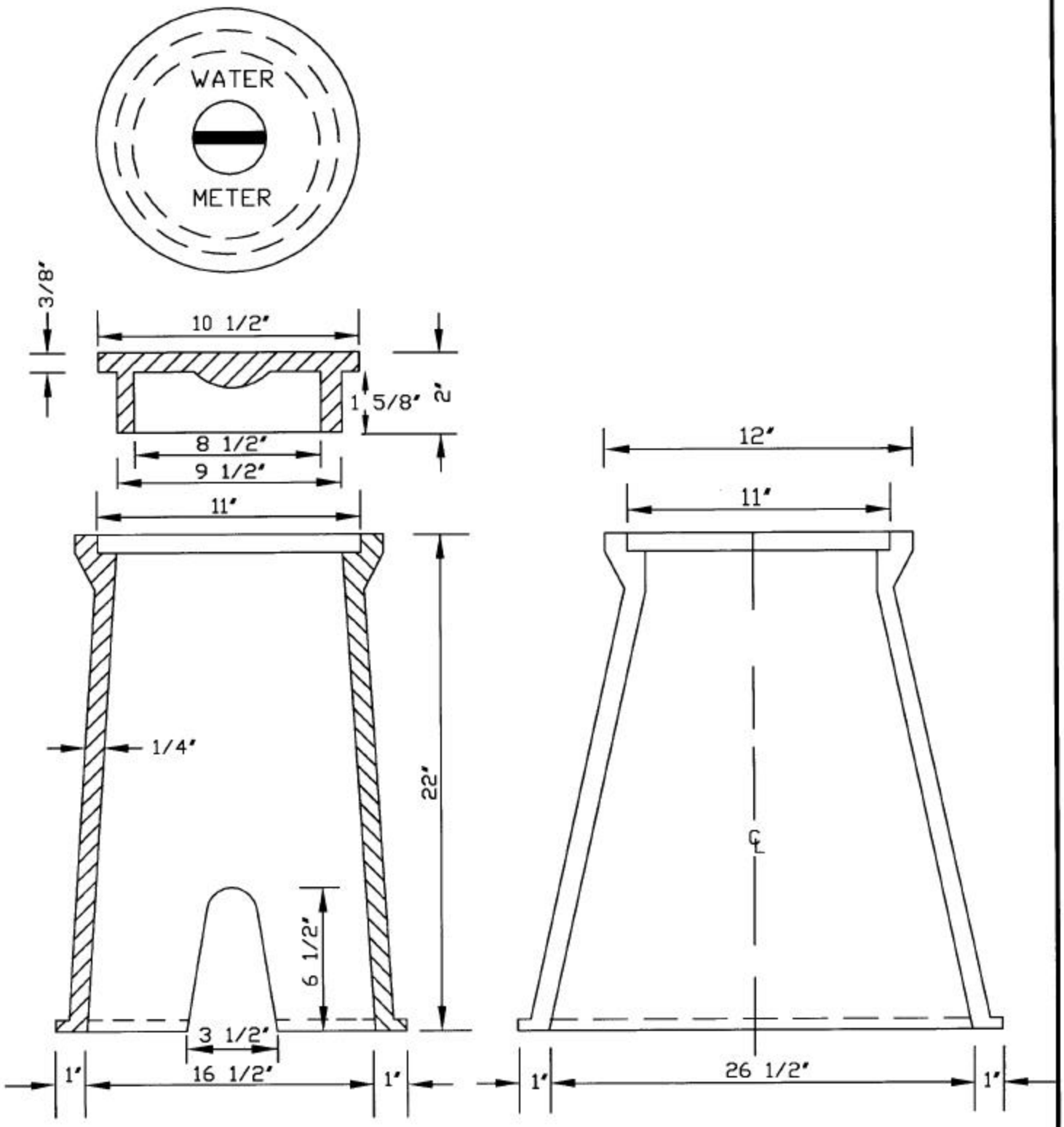
TOP VIEW



TOP VIEW

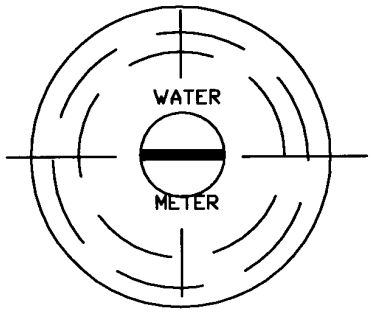
DATE JAN. 1996 REVISIONS JAN. 2003	**PLASTIC METER BOX (5/8" METERS)**	DRWG. NO. MET-2

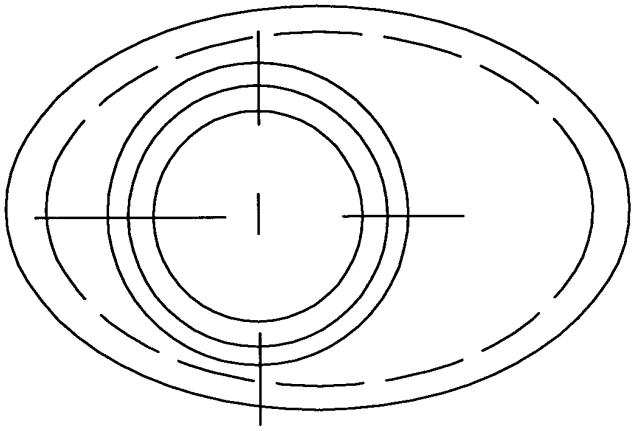
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

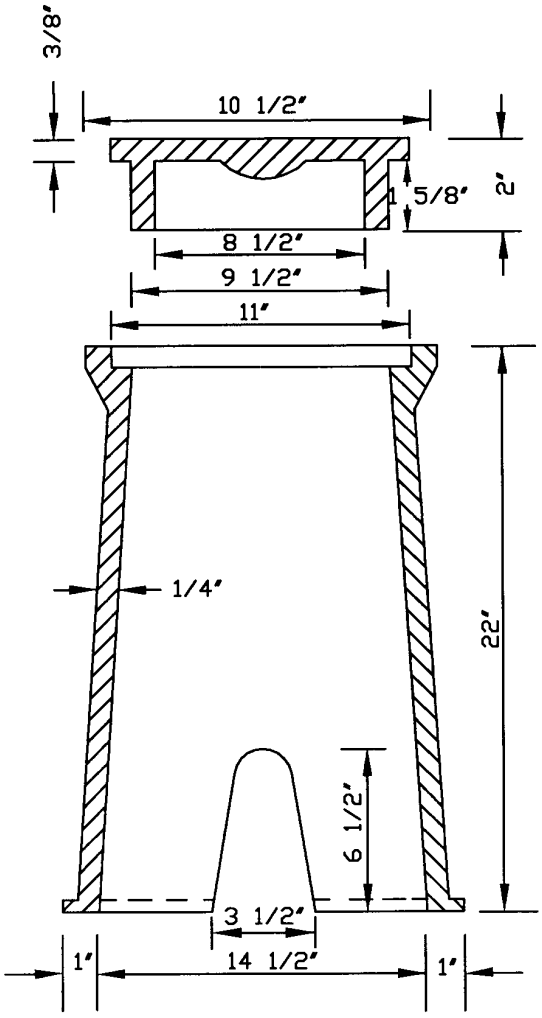


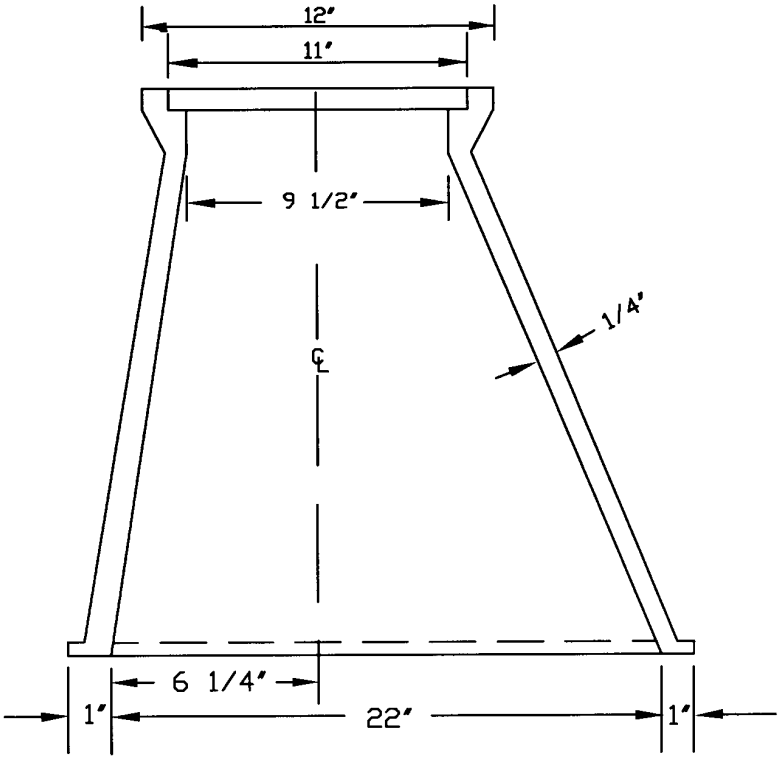
DATE	CAST IRON METER BOX (TYPE 1) (FOR 1" METERS)	DRWG. NO.
JAN. 1996		MET-3
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



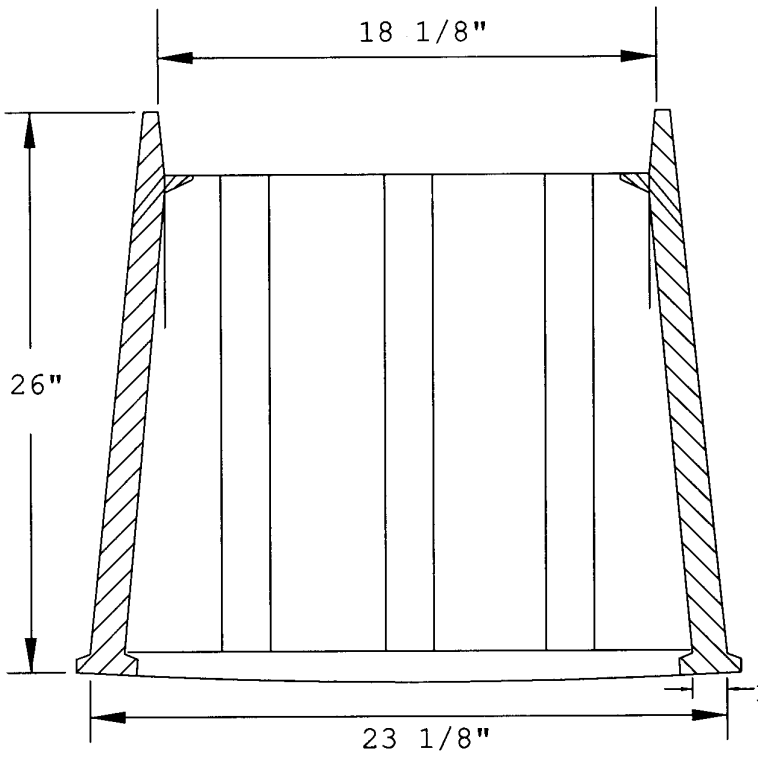




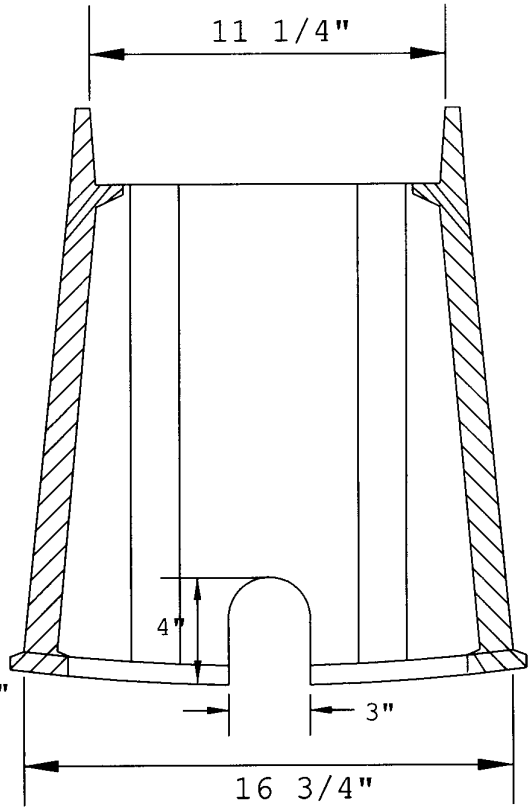


DATE JAN. 1996	CAST IRON METER BOX (TYPE 2) (5/8" METERS)	DRWG. NO. MET-4
REVISIONS		

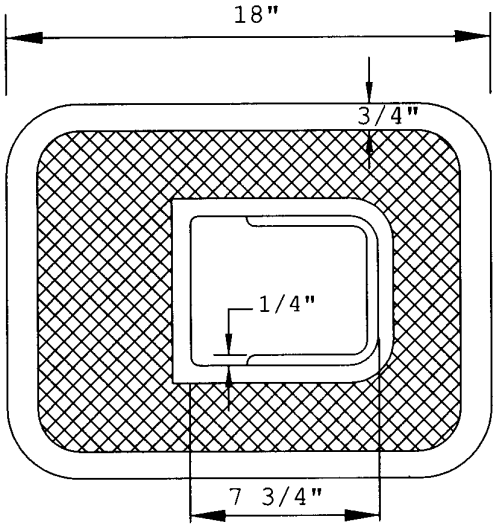
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



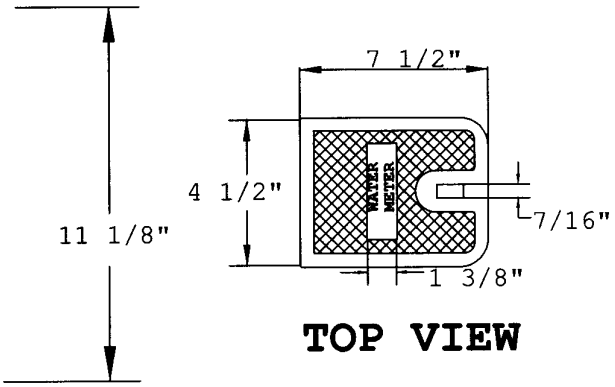
LONG SIDE VIEW



SHORT SIDE VIEW



TOP VIEW



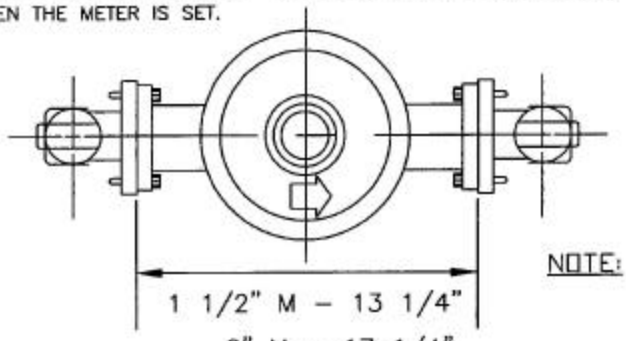
TOP VIEW

DATE JAN. 1996 REVISIONS JUNE 2000	**PLASTIC METER BOX (1" METERS)**	DRWG. NO. MET-5

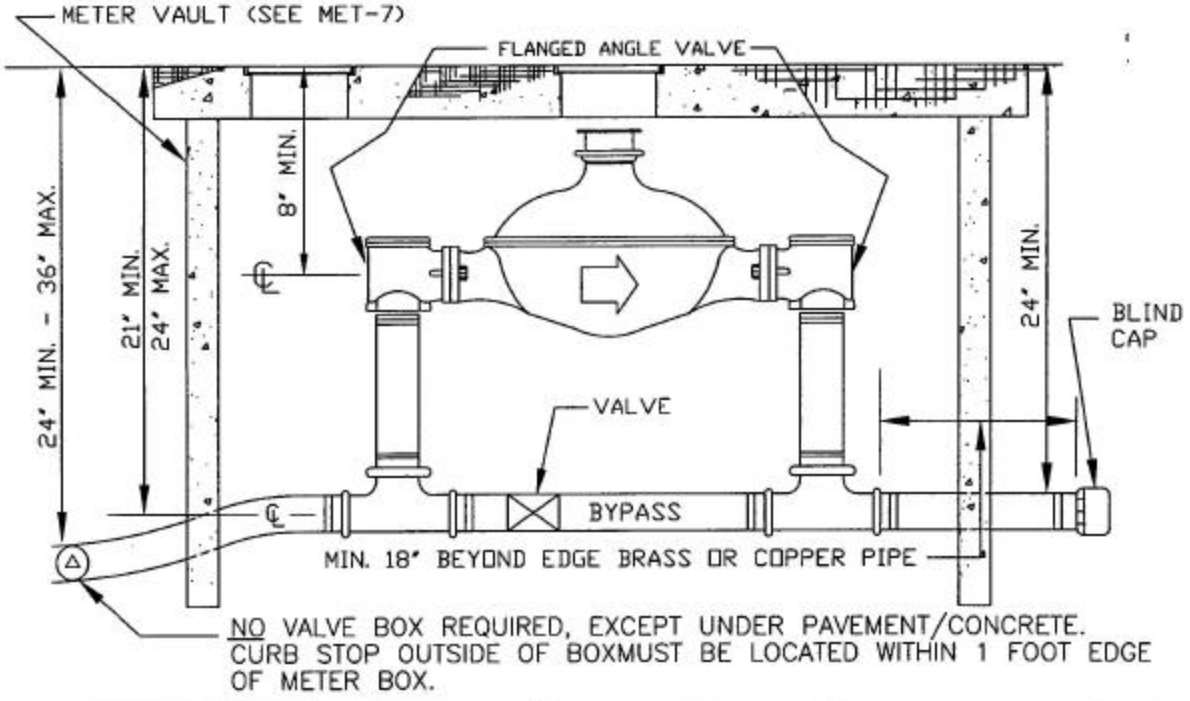
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTES:

1. SADDLES SHALL BE USED FOR ALL 1 1/2" AND 2" TAPS.
2. WATER SERVICE LATERALS FOR 1 1/2" AND 2" SERVICES WILL BE TYPE-K HARD COPPER. CONNECTIONS FOR 1 1/2" AND 2" SERVICES WILL BE SWEAT 95/5 (LEADLESS) SOLDER AND A SUITABLE FLUX; APPROVED COMPRESSION FITTINGS; OR A ProPress SYSTEM. ALL CONNECTIONS AT CORPORATION STOPS WILL BE APPROVED COMPRESSION FITTINGS.
3. TAPS SHOULD BE MADE AT THE SPRING LINE OF THE MAIN LINE.
4. FOR DETAIL OF VAULT, SEE MET-7.
5. YOKE MUST BE INSTALLED WITH A METER SPACER THAT WILL BE FURNISHED TO THE CONTRACTOR BY THE UTILITIES DEPARTMENT INSPECTOR. THE SPACER WILL BE REMOVED BY THE UTILITIES DEPARTMENT WHEN THE METER IS SET.



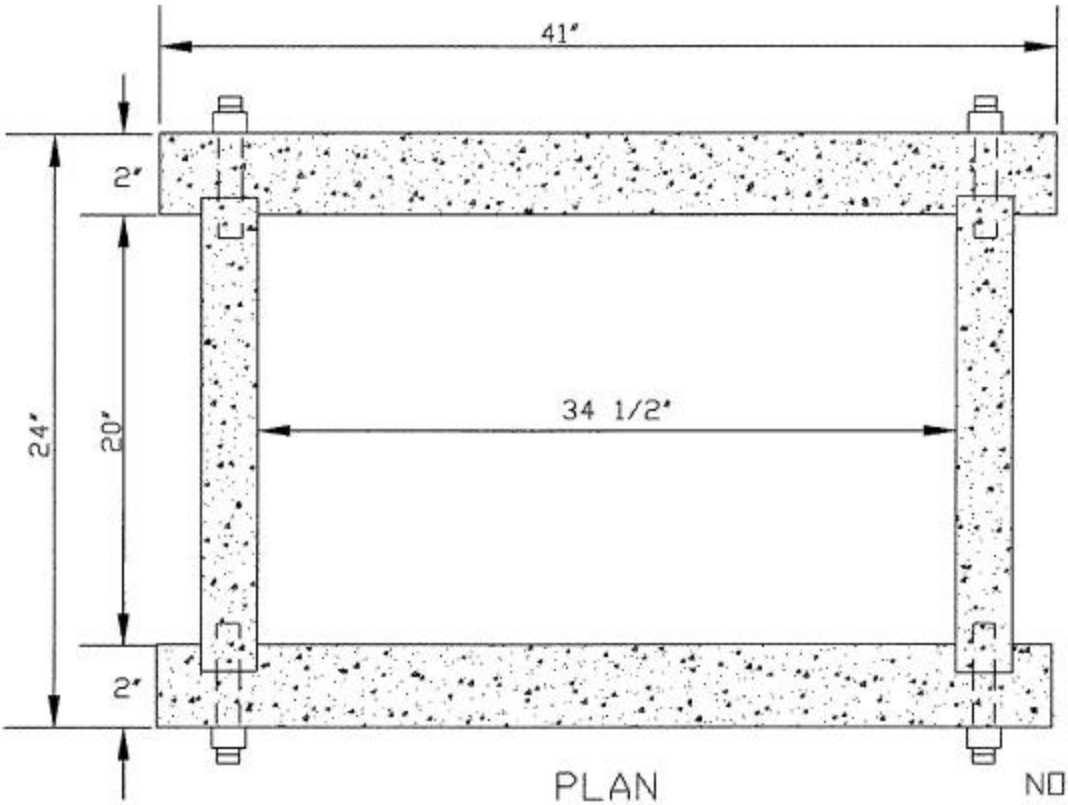
NOTE: BYPASS SHALL BE LOCATED ABOVE OR AT FLOOR LEVEL OF METER VAULT.



NO VALVE BOX REQUIRED, EXCEPT UNDER PAVEMENT/CONCRETE. CURB STOP OUTSIDE OF BOXMUST BE LOCATED WITHIN 1 FOOT EDGE OF METER BOX.

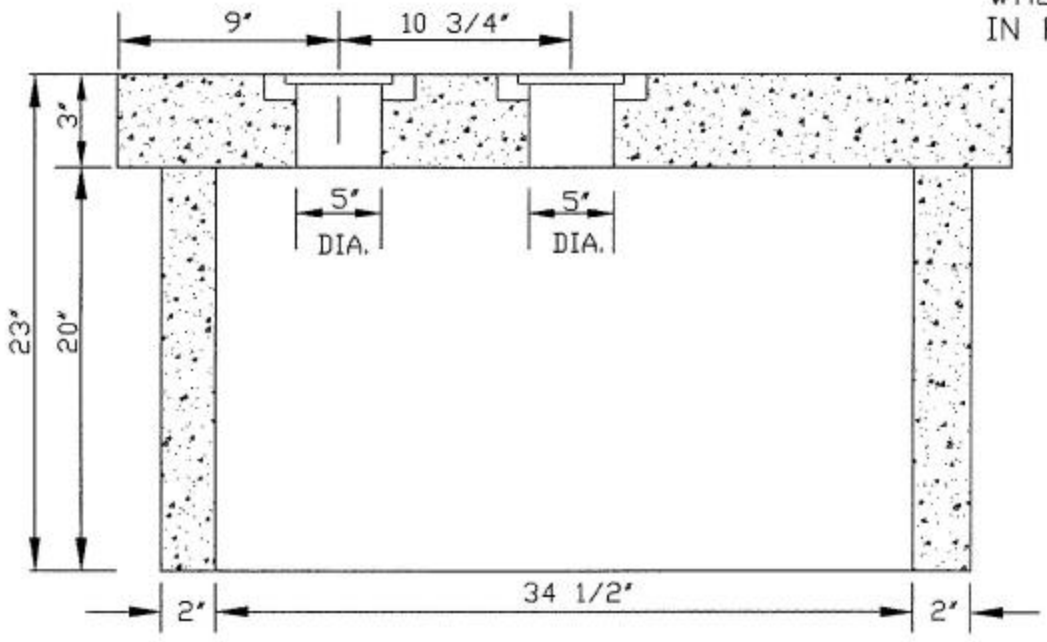
DATE: JAN. 1996	1 1/2" OR 2" DISC METER SETTINGS	DRWG. NO. MET-6
REVISIONS: DEC. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN

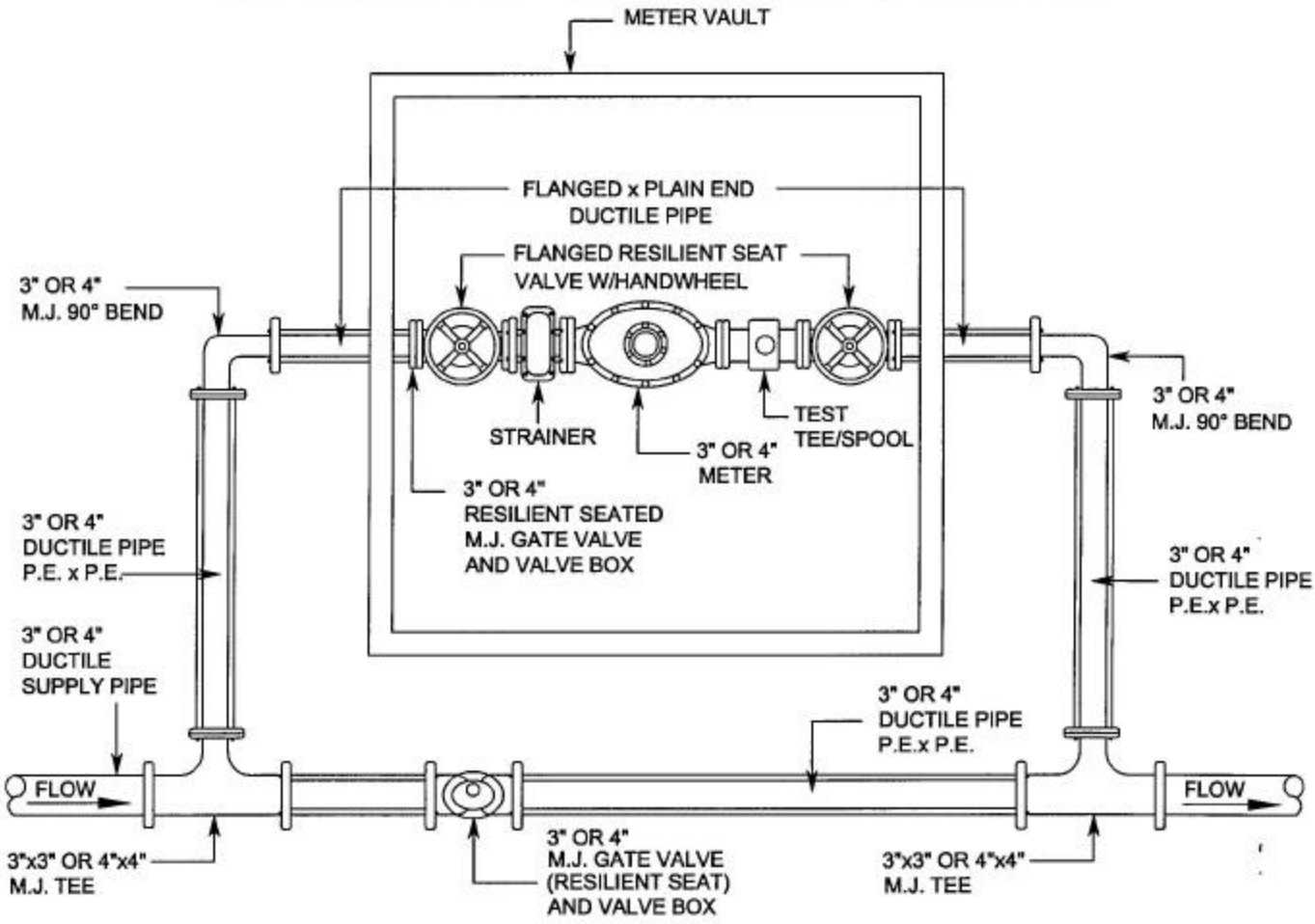
NOTE:
5" REINFORCEMENT TOP REQUIRED WHEN LOCATED IN PAVED AREA.



ELEVATION

DATE		DRWG. NO.
JAN. 1996	1 1/2" & 2" KNOCK DOWN METER BOX	MET-7
REVISIONS JAN. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN VIEW

NOTES:

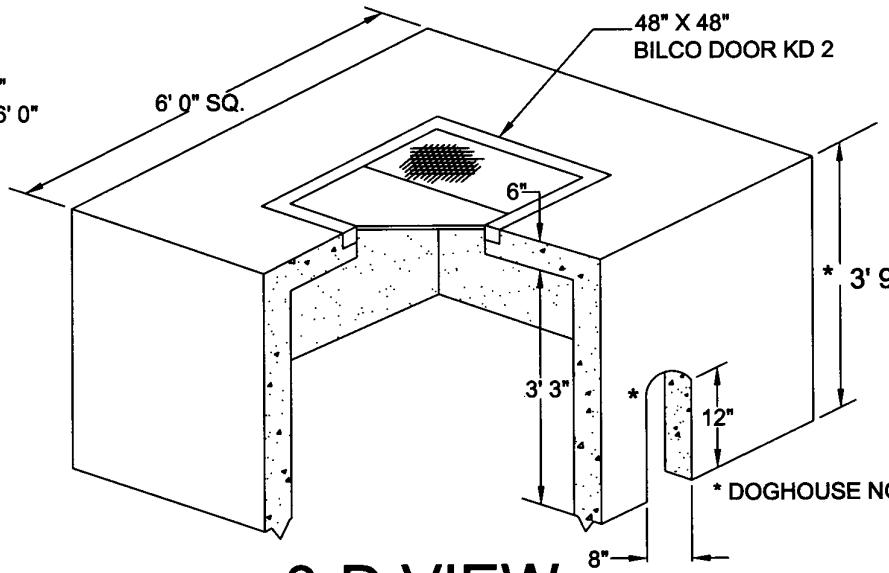
1. THE CONTRACTOR SHALL NOT INSTALL THE PIPING UNTIL THE METER AND ASSOCIATED APPURTENANCES HAVE BEEN PURCHASED FROM THE UTILITIES DEPARTMENT AND ARE ON THE PROJECT, SO THAT THE CORRECT LENGTH OF PIPE IS INSTALLED ACCORDING TO THIS DETAILED CONFIGURATION. STRAINER, METER AND TEST TEE ARE PROVIDED BY THE COUNTY.
2. CONTRACTOR IS REQUIRED TO COORDINATE WITH THE UTILITY DEPARTMENT OPERATION CENTER, THE PICK UP OF A COUNTY APPROVED METER. ALL CONNECTION FEES AND/OR OTHER APPLICABLE CHARGES OR FEES MUST BE PAID PRIOR TO PICKING UP THE WATER METER, TEST TEE AND STRAINER FROM THE UTILITIES DEPARTMENT.
3. 3" OR 4" APPROVED JOINT RESTRAINT DEVICES ARE REQUIRED ON ALL MECHANICAL JOINT (M.J.) CONNECTIONS. ALL FITTINGS SHALL BE MECHANICAL JOINT.
4. ALL FITTINGS INSIDE OF THE VAULT SHALL BE FLANGED.
5. NO CHECK VALVE OR PRV IS ALLOWED ON THE INLET SIDE OF THE METER.
6. FOR DETAILS OF VAULT, SEE MET–9 AND MET–10.

DATE		DRWG. NO.
JAN. 1996	3" OR 4" METER SETTING	MET–8
REVISIONS DEC. 2003		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

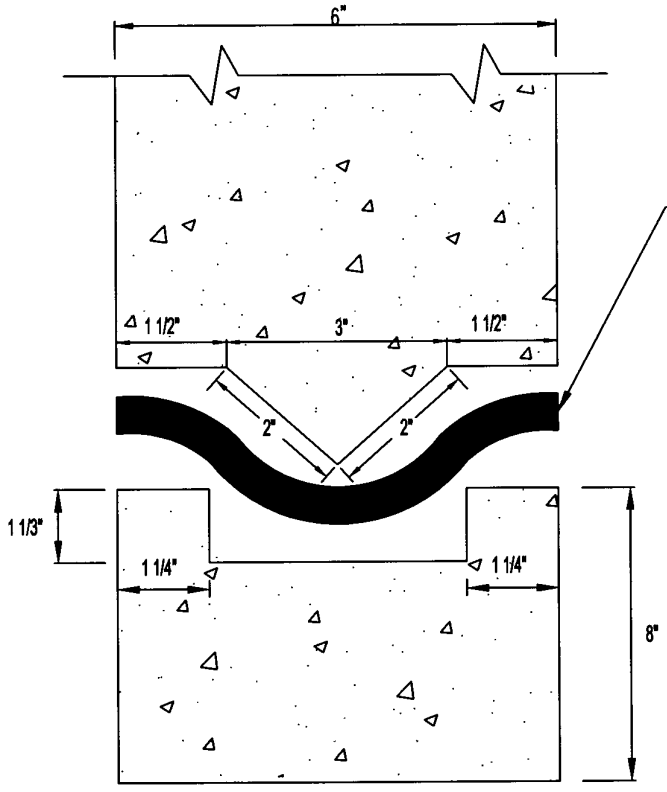
DIMENSIONS
INSIDE - 5'0" X 5'0"
OUTSIDE - 6'0" X 6' 0"

SMITH-MIDLAND
MODEL 550 CUS
OR EQUAL



* DOGHOUSE NOTCH AS REQUIRED

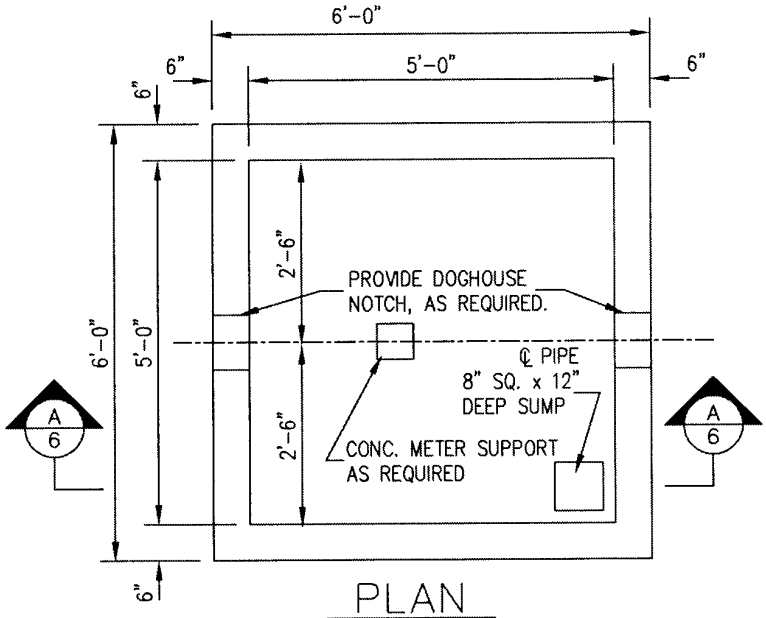
3-D VIEW



VAULT FLOOR
X-SECTION OF V-JOINT

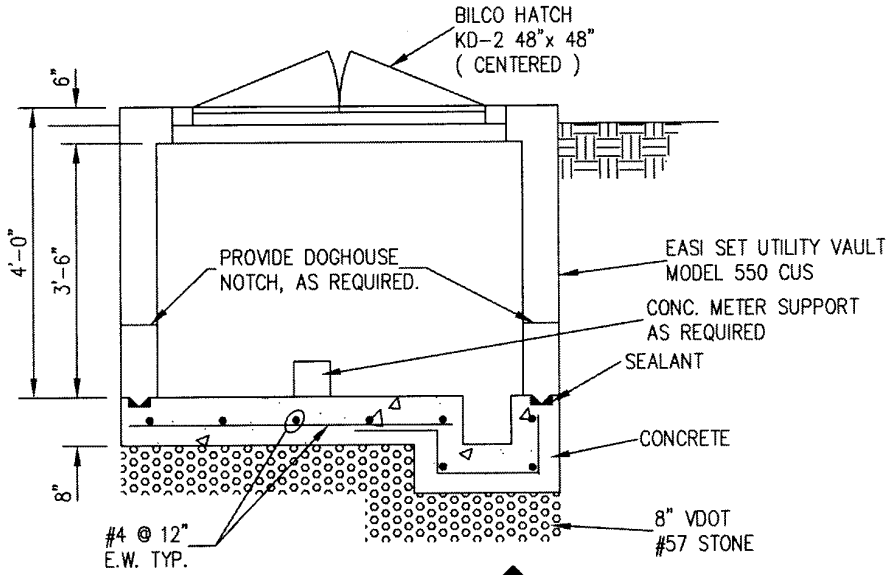
DATE		DRWG. NO.
DEC. 1985	3" AND 4" METER VAULT	MET-9
REVISIONS MARCH 1998		SHT. 1 of 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN

NOT TO SCALE

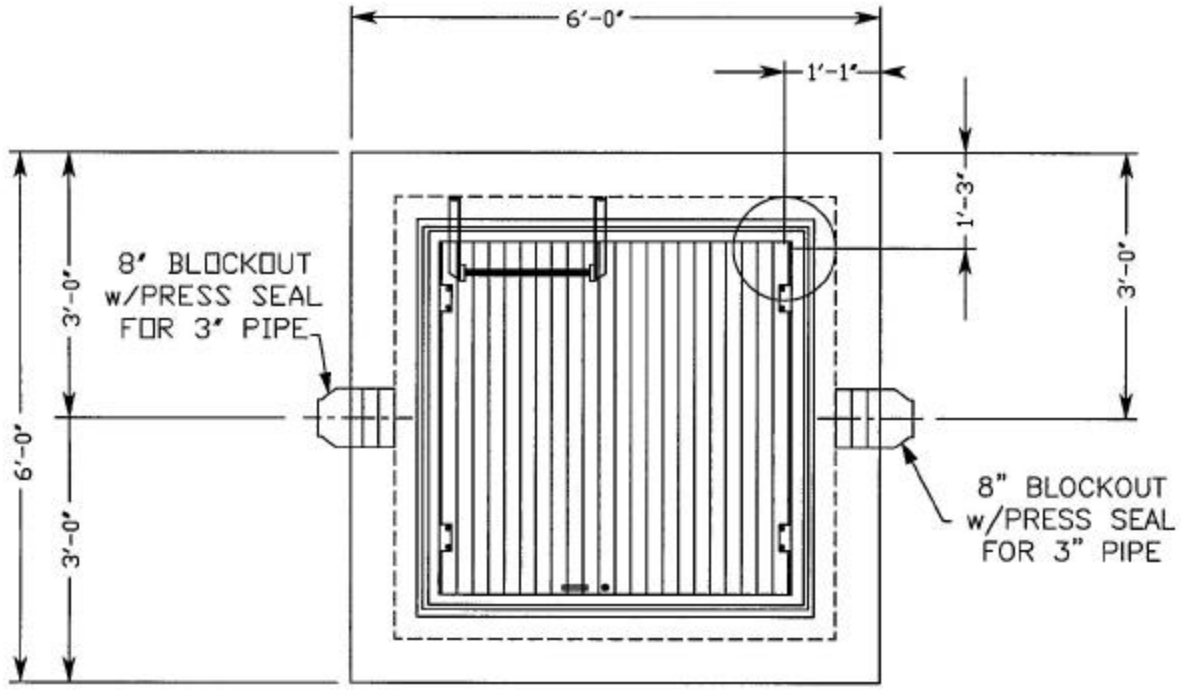


SECTION

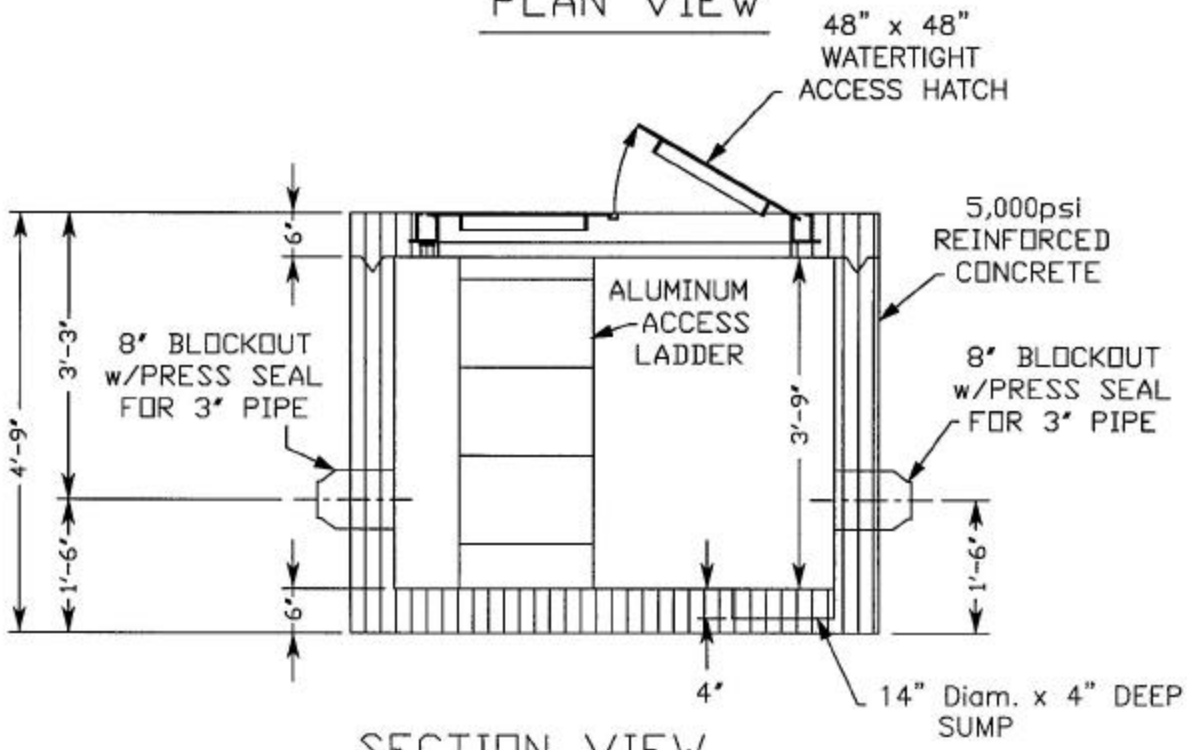
NOT TO SCALE

DATE		DRWG. NO.
JAN. 1988	# 3" AND 4" METER VAULT	MET-9
REVISIONS MARCH 1998		SHT. 2 of 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN VIEW



SECTION VIEW

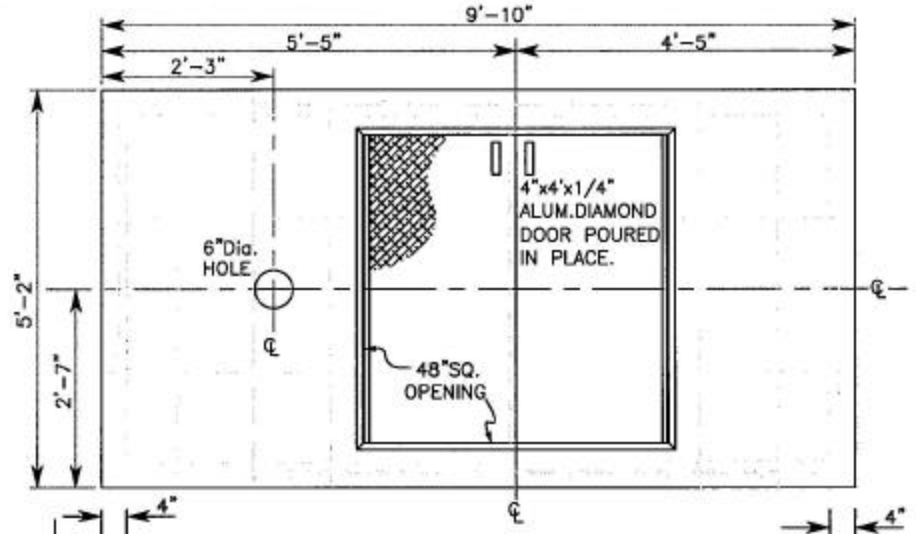
NOTES

1. CLEAR FLOW VAULT SHIPPED ASSEMBLED WEIGHING APPROX. 12,000 LBS.

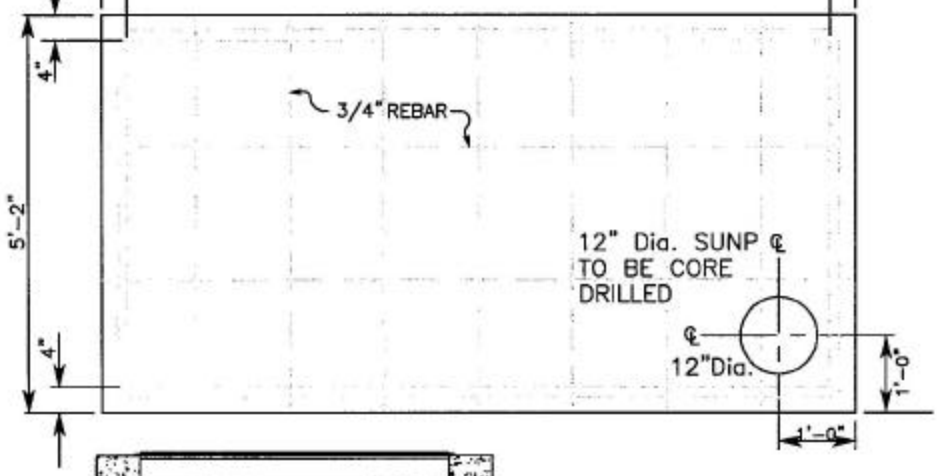
DATE: APRIL 2001 REVISIONS: MARCH 2002	**ALTERNATE VAULT DETAIL FOR 3" and 4" WATER METERS**	DRWG. NO. **MET-10** SHT. 1 of 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

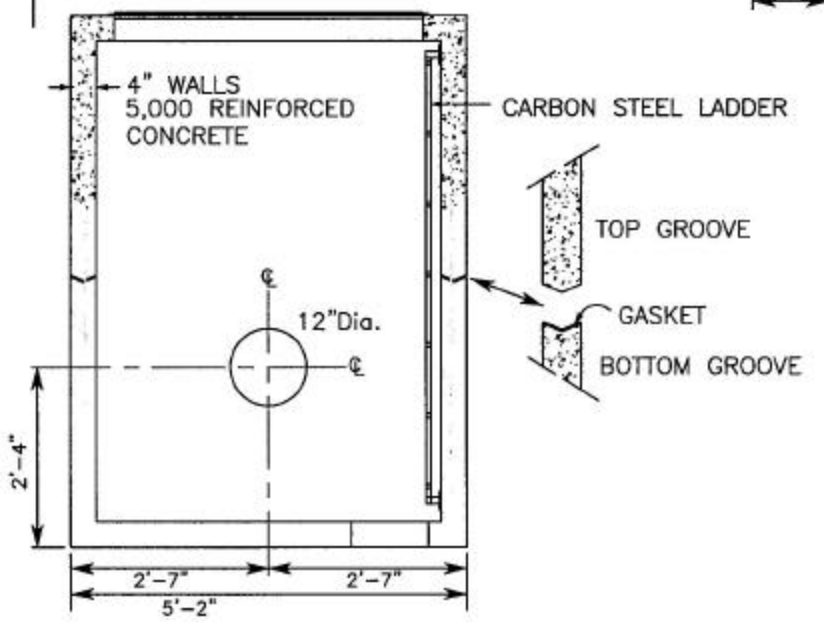
TOP VIEW



BOTTOM VIEW



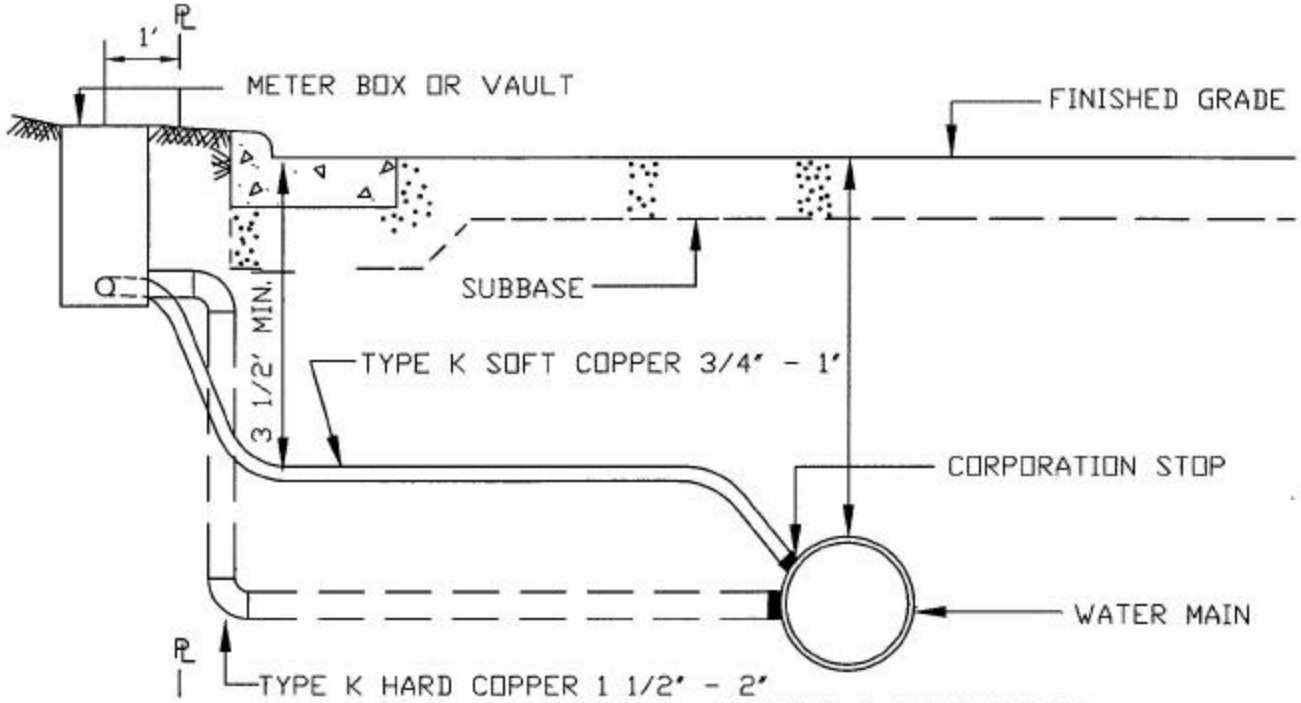
END VIEW



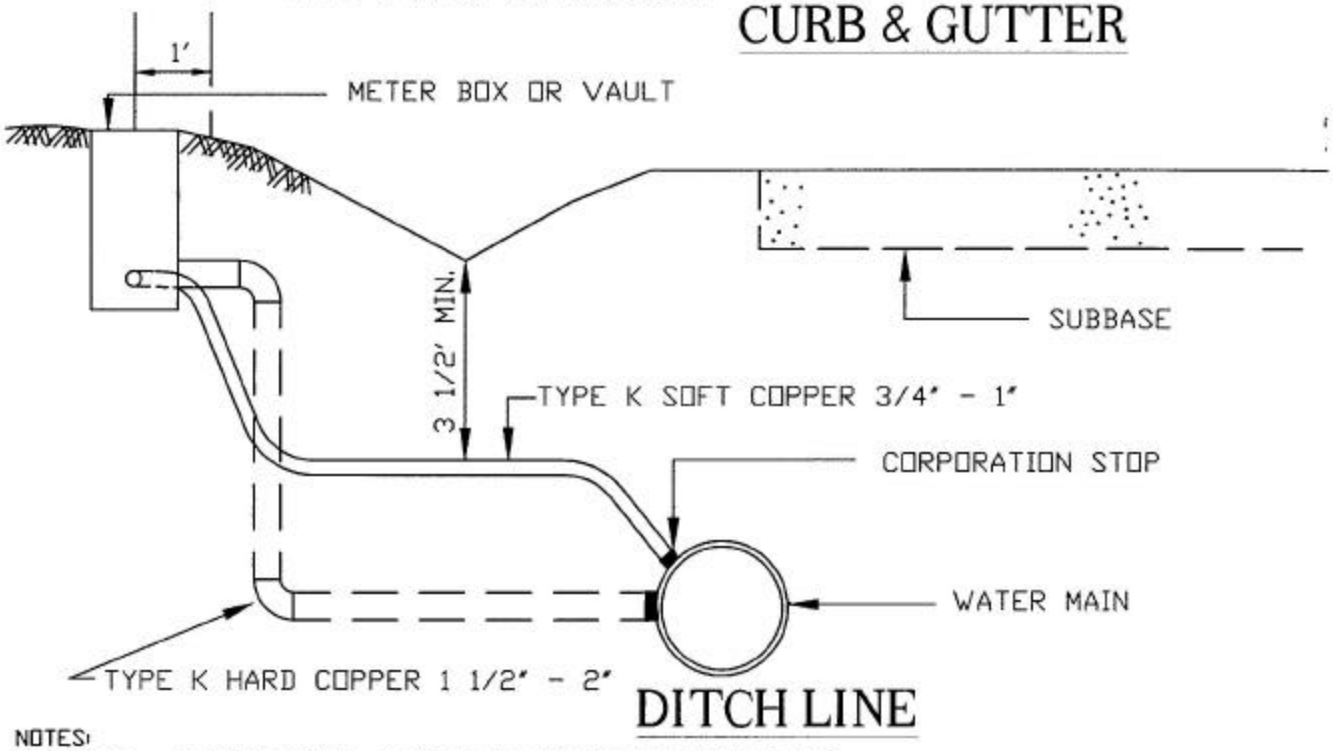
NOTE: M & B CONCRETE PRODUCTS INC'S VAULT.

DATE: Sept. 2001 REVISIONS: March 2002	ALTERNATE VAULT DETAIL FOR 3" and 4" WATER METERS	DRWG. NO. MET-10 SHT. 2 of 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



CURB & GUTTER



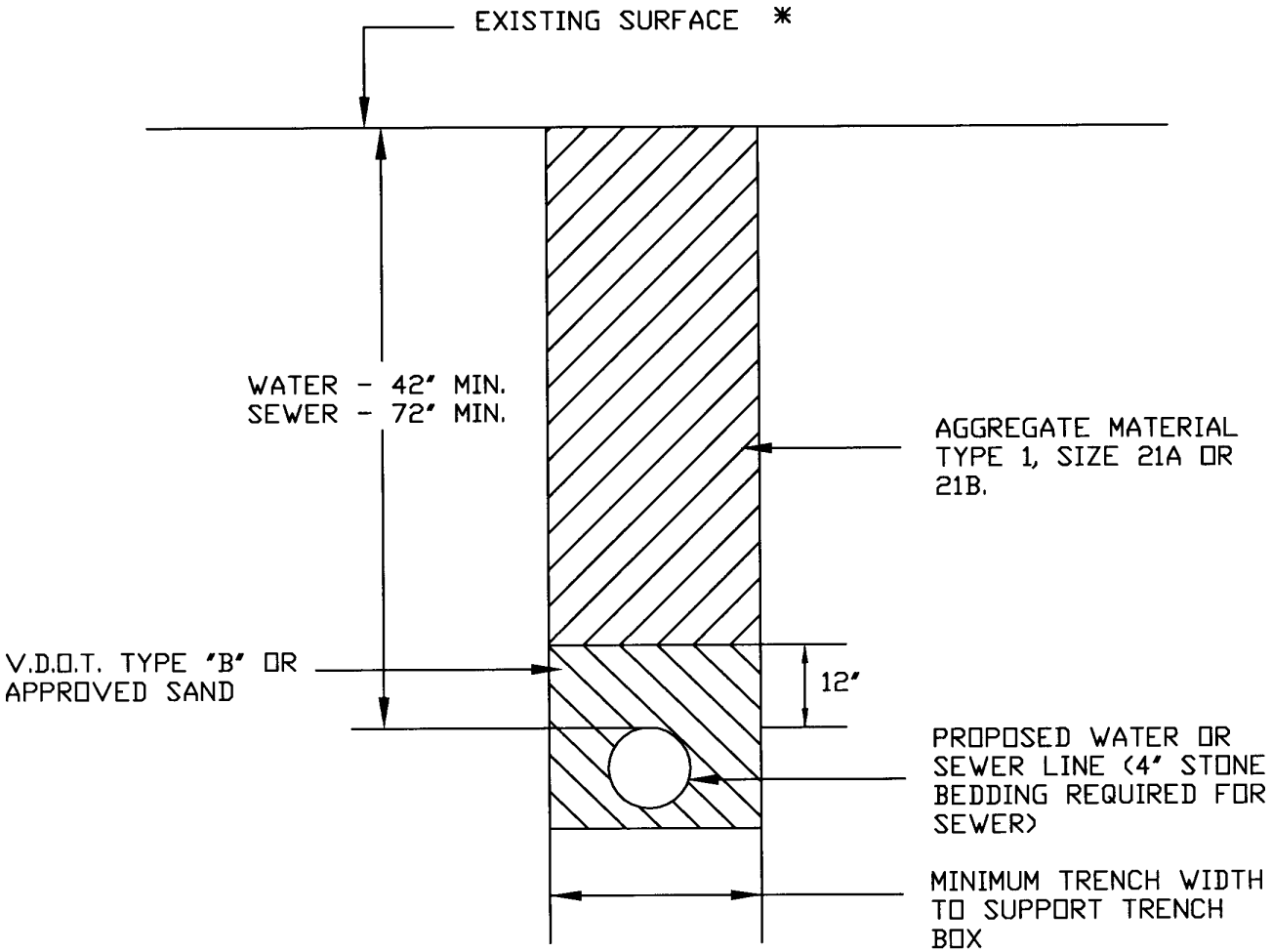
DITCH LINE

NOTES:

1. 1 1/2" - 2" TAPS SHOULD BE MADE AT THE SPRING LINE OF THE MAIN LINE.
2. SADDLE MUST BE USED IF TAP IS MADE IN PVC OR A/C PIPE.

DATE: JAN. 1996	WATER SERVICE INSTALLATION DETAIL	DRWG. NO. MET-11
REVISIONS: JAN. 2003		

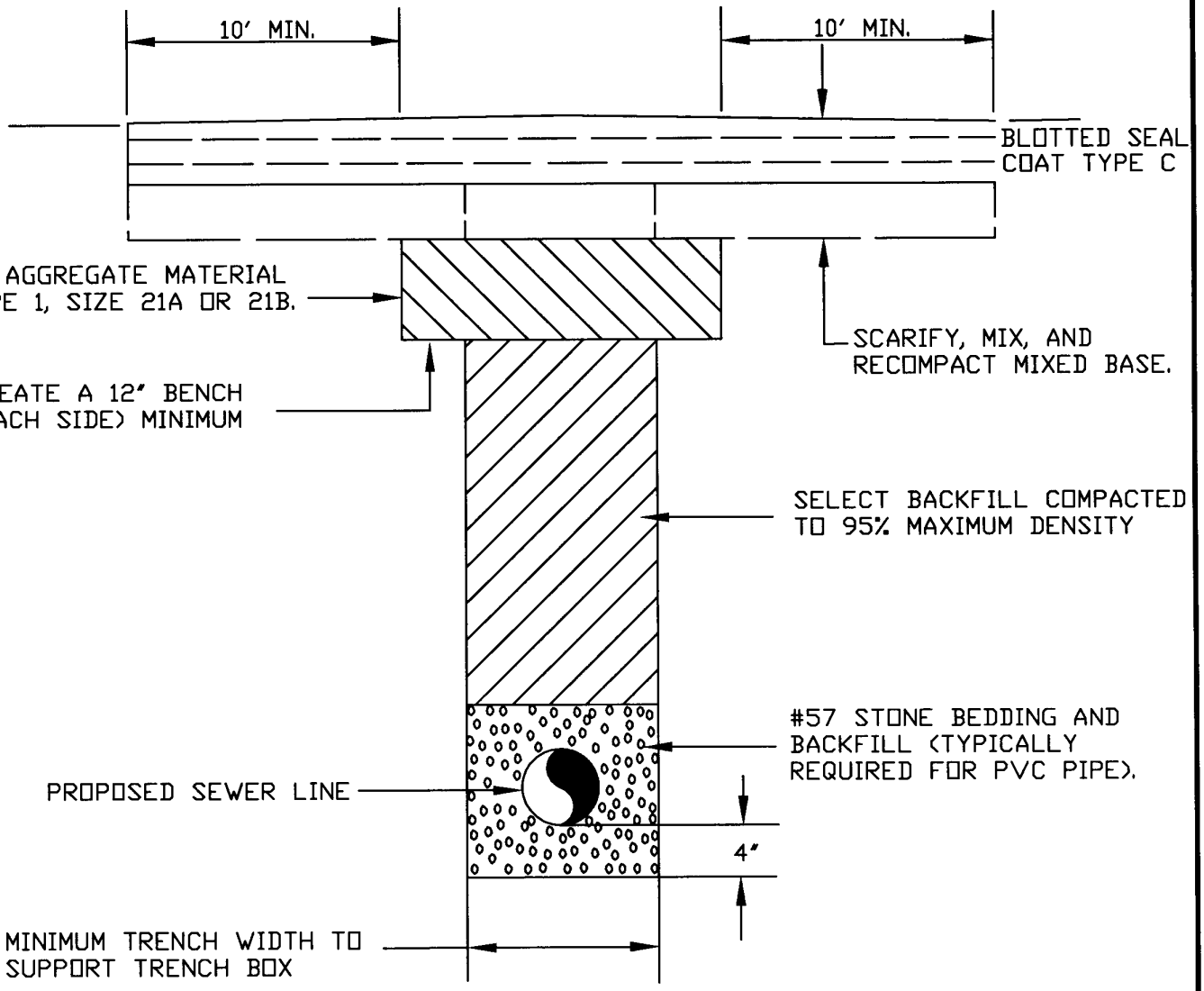
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES
VDOT APPROVED



* NOTE: CAPPING DONE ON SHOULDERS, GRAVEL AND DIRT ROADS.

DATE JAN. 1996	TYPICAL SECTION FOR REPAIR OF "PRIMARY" ROADWAY SHOULDERS OR OTHER UNPAVED TRAVELED AREAS FOR WATER & SEWER LINE CROSSINGS	DRWG. NO. PAV-1
REVISIONS		

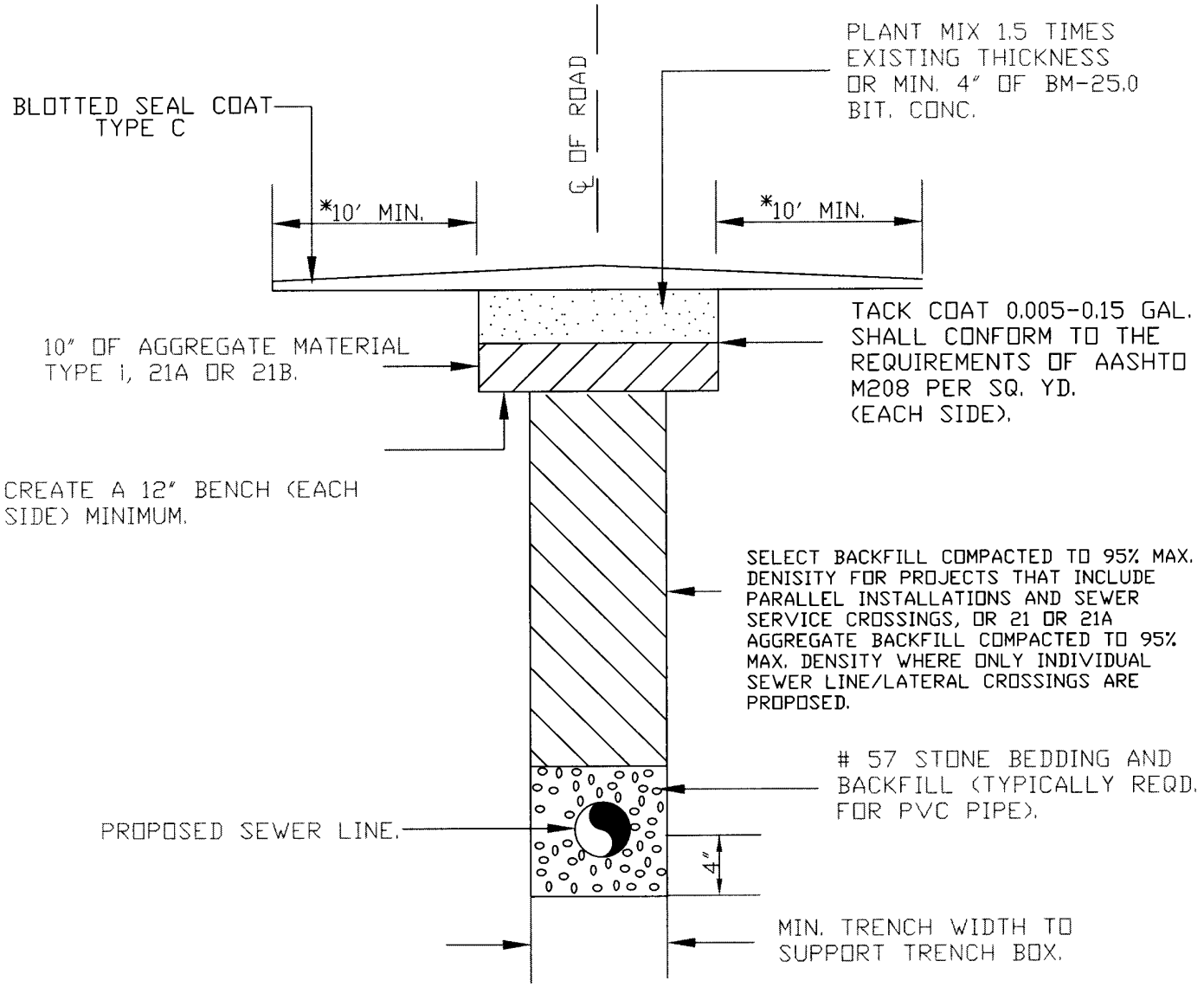
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES
VDOT APPROVED



SURFACE - BLOTTED SEAL COAT TYPE C: THE INITIAL SEAL AND FINAL SEAL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M208 @ 0.17 GAL./SQ. YD. WITH 15 LBS. OF NO 8P STONE/SQ. YD. EACH. THE BLOT SEAL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M208 @ 0.15 GAL./SQ. YD. WITH 10 LBS. OF FINE AGGREGATE GRADE B SAND PER SQ. YD.

DATE JAN. 1996	TYPICAL SECTION FOR REPAIR OF OPEN CUT AFTER PLACEMENT OF SEWER IN SURFACE TREATED ROAD WHERE A BASE (EXCEPT CONCRETE OR PLANT MIX) IS PRESENT	DRWG. NO. PAV-2
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES
VDOT APPROVED

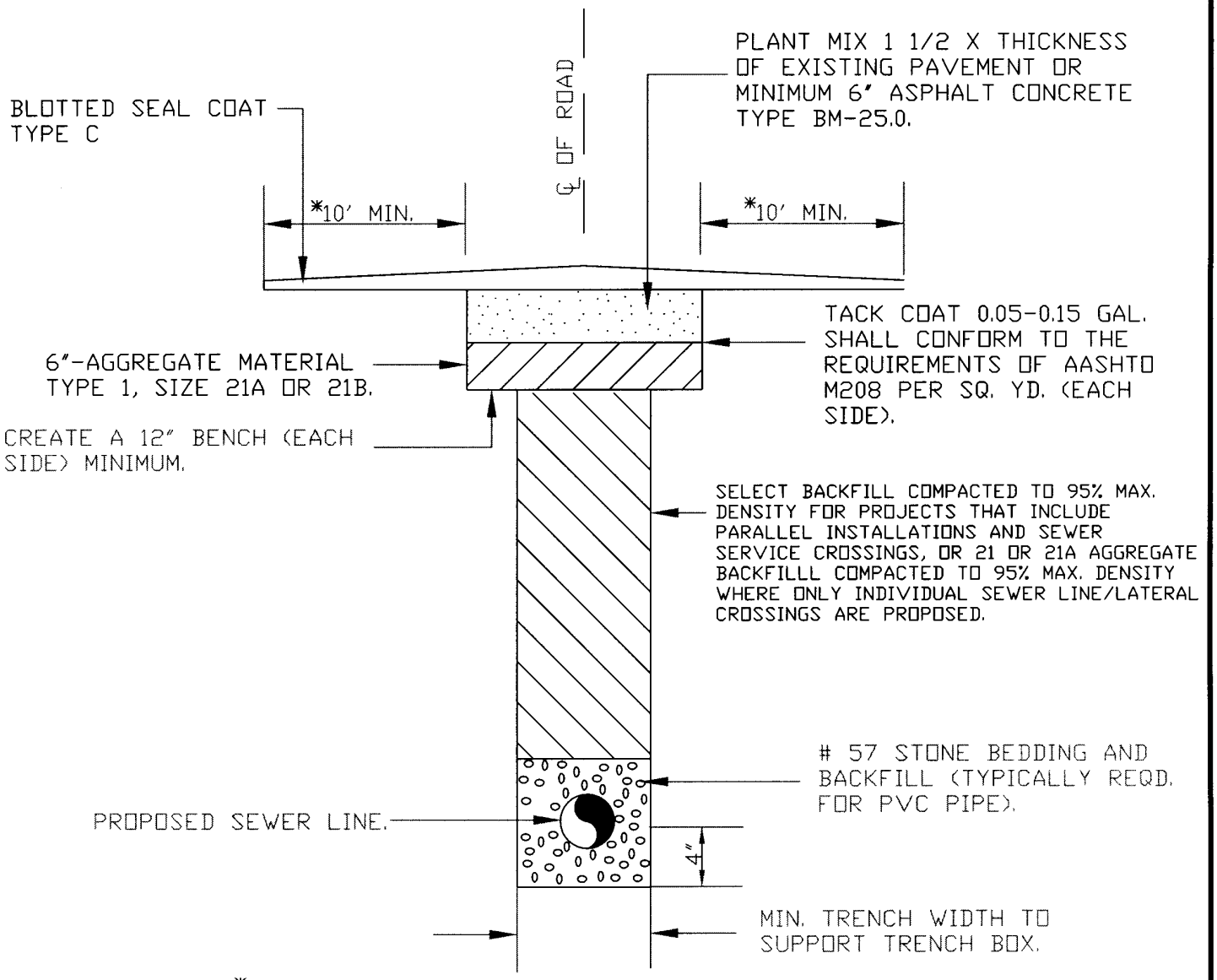


* REPLACEMENT OF PAVEMENT SHALL BE FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT.

SURFACE - BLOTTED SEAL COAT TYPE C: THE INITIAL SEAL AND FINAL SEAL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M208 @ 0.17 GAL./SQ. YD. WITH 15 LBS. OF NO 8P STONE/SQ. YD. EACH. THE BLOT SEAL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M208 @ 0.15 GAL/SQ. YD. WITH 10 LBS. OF FINE AGGREGATE GRADE B SAND PER SQ. YD.

DATE JAN. 1996 REVISIONS JUNE 2000	TYPICAL SECTION FOR REPAIR OF OPEN CUT AFTER PLACEMENT OF SEWER IN SURFACE TREATED ROAD (APPLIES TO PARALLEL INSTALLATION & SERVICE CROSSINGS)	DRWG. NO. PAV-3

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES
VDOT APPROVED

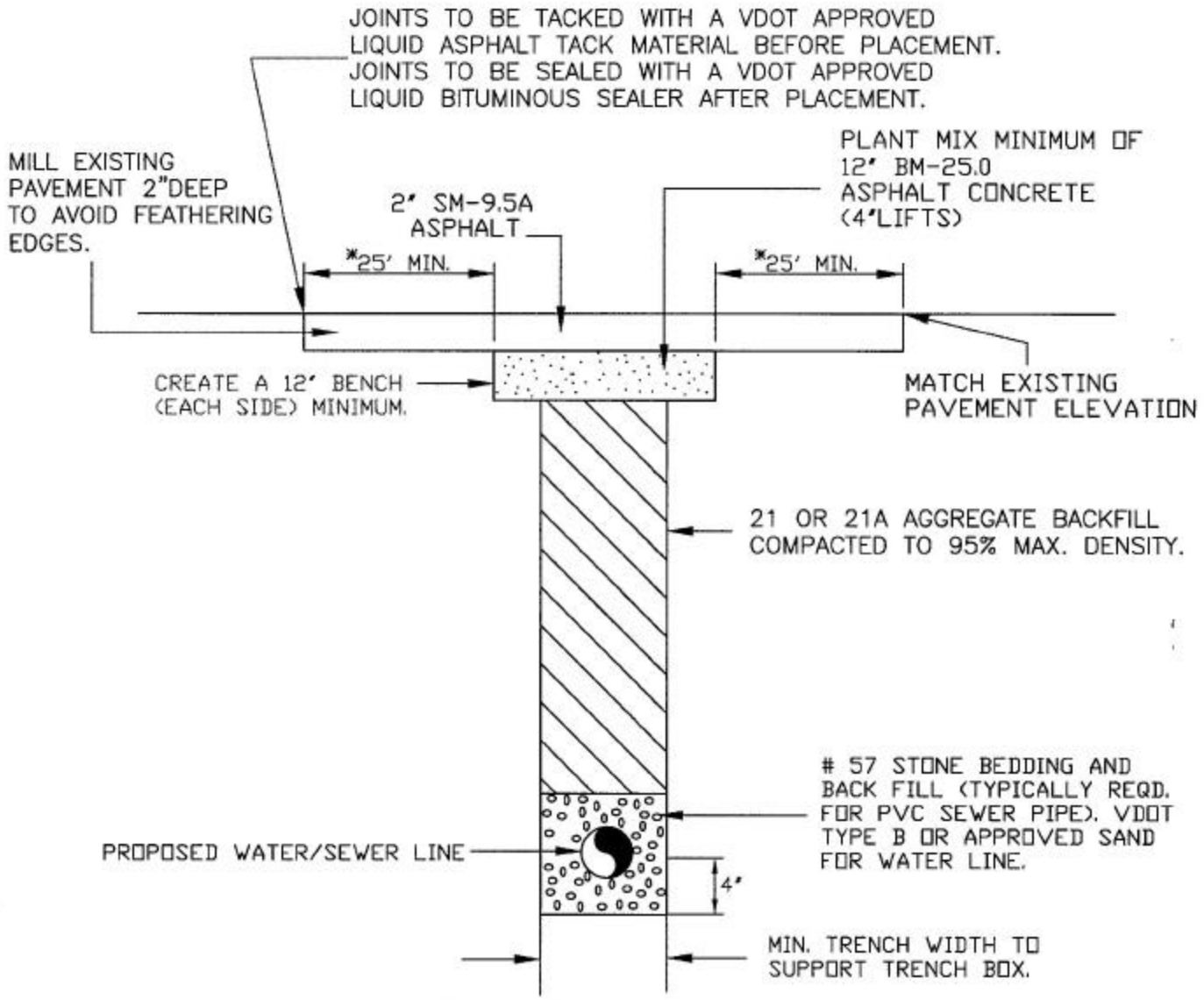


* REPLACEMENT OF PAVEMENT SHALL BE FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT.

SURFACE-BLOTTED SEAL COAT TYPE C: THE INITIAL SEAL AND FINAL SEAL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M208 @ 0.17 GAL./SQ. YD. WITH 15 LBS. OF NO. 8P STONE/SQ. YD. EACH. THE BLOT SEAL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M208 @ 0.15 GAL./SQ. YD. WITH 10 LBS. OF FINE AGGREGATE GRADE B SAND PER SQ. YD.

DATE	TYPICAL SECTION FOR REPAIR OF OPEN CUT AFTER PLACEMENT OF SEWER IN SURFACE TREATED ROAD WHERE A PLANT MIX OR CONCRETE BASE IS PRESENT APPLIES TO PARALLEL AND SERVICE CROSSINGS)	DRWG. NO.
JAN. 1996		PAV-4
REVISIONS JUNE 2000		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES
VDOT APPROVED

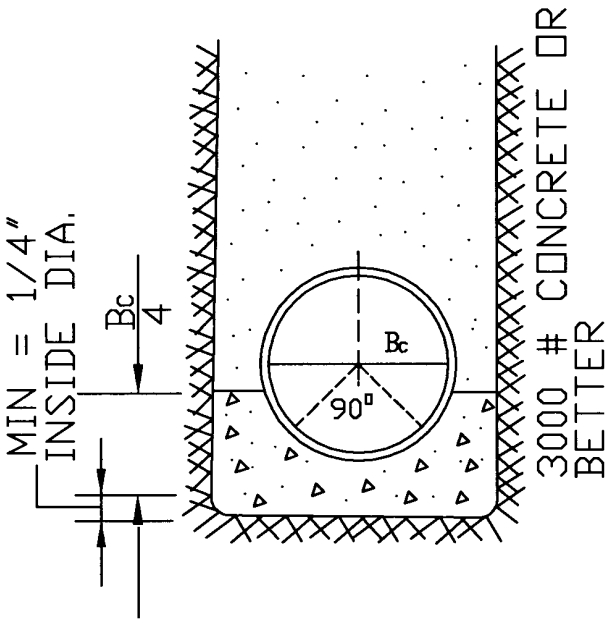


* PARALLEL INSTALLATION REPLACEMENT OF PAVEMENT SHALL BE FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT.

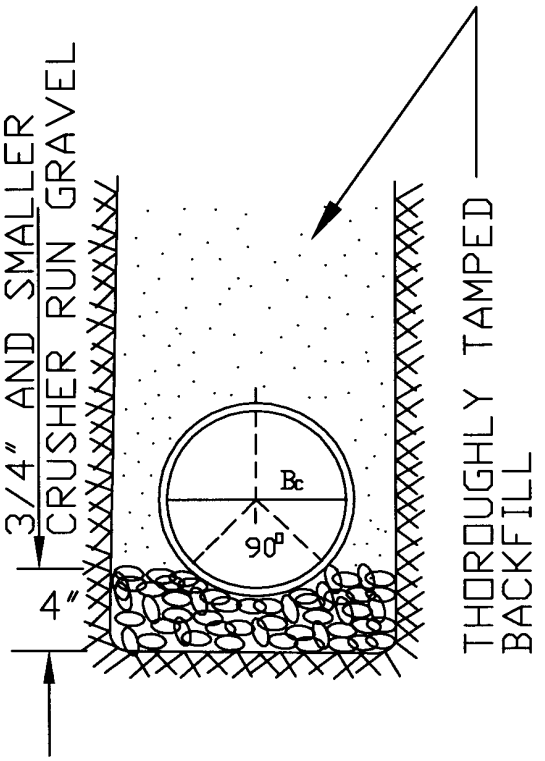
DATE: JAN. 1996	TYPICAL SECTION FOR REPAIR OF OPEN CUT AFTER PLACEMENT OF WATER AND SEWER LINES IN PLANT MIX ROADS	DRWG. NO. PAV-5
REVISIONS: MARCH 2002		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

MAXIUM TRENCH WIDTH SHALL BE 33" FOR SEWER UP TO 12" DIAMETER. USE OUTSIDE PIPE DIAMETER PLUS 18" FOR SEWER 15" AND LARGER.



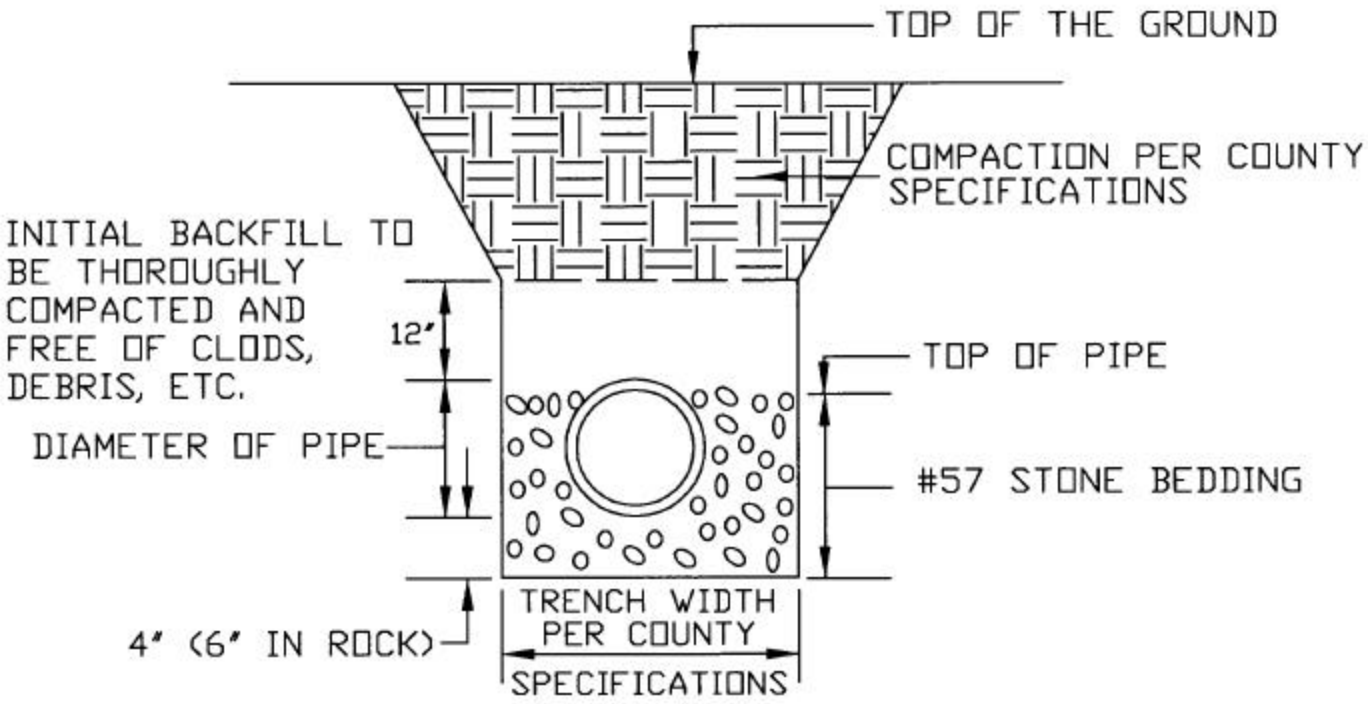
CLASS A



CLASS B

DATE JAN. 1996	TYPES OF SEWER BEDDING	DRWG. NO. SEW-1
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

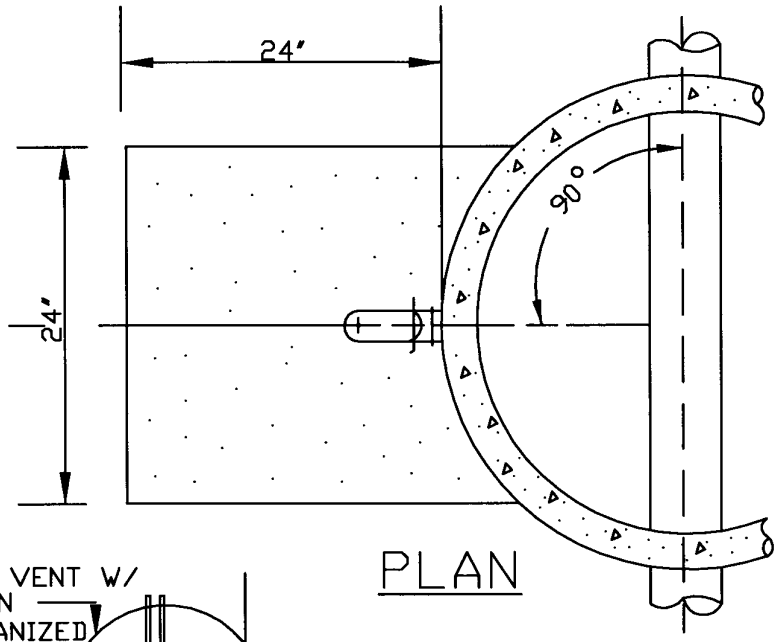


NOTE: FOR DEPTHS IN EXCESS OF 14 FEET, STONE TO EXTEND TO 12" ABOVE PIPE.,

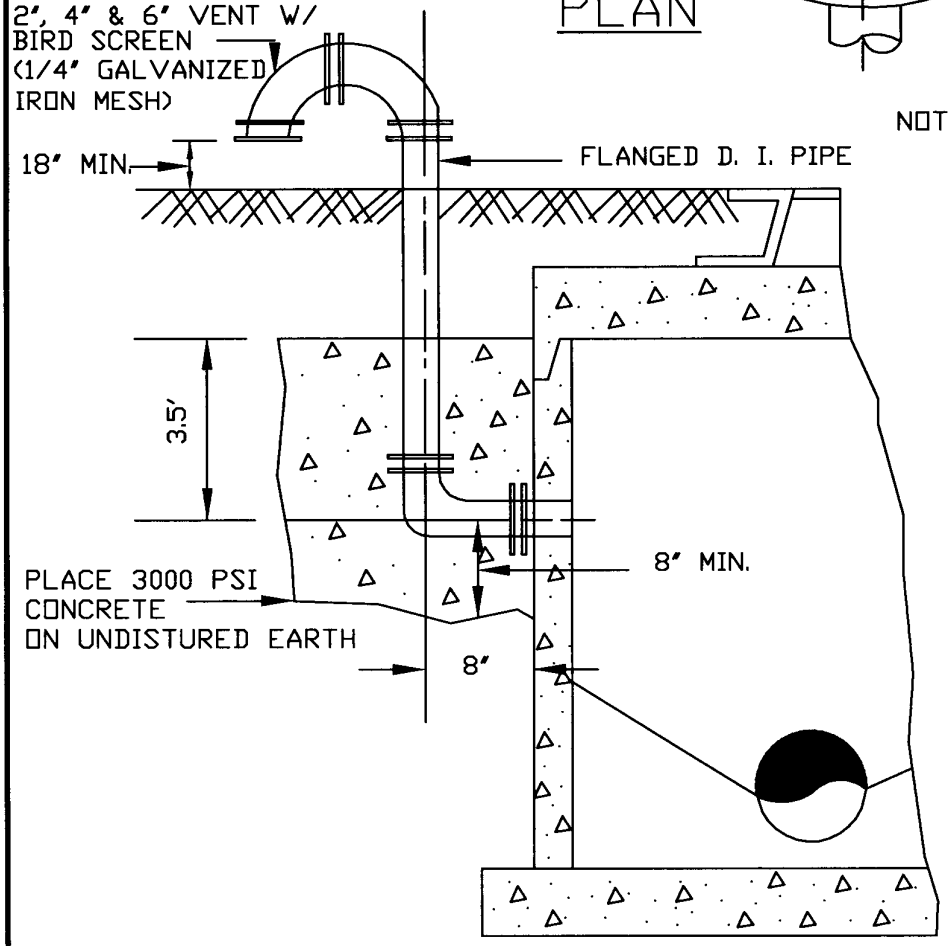
NOTE: CONTRACTOR MUST INSURE THE STONE IS PROPERLY COMPACTED, ESPECIALLY UNDER THE HAUNCHES OF THE PIPE.

DATE JAN. 1996	BEDDING AND BACKFILL DETAIL FOR PLASTIC SEWER PIPE	DRWG. NO. SEW-2
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN



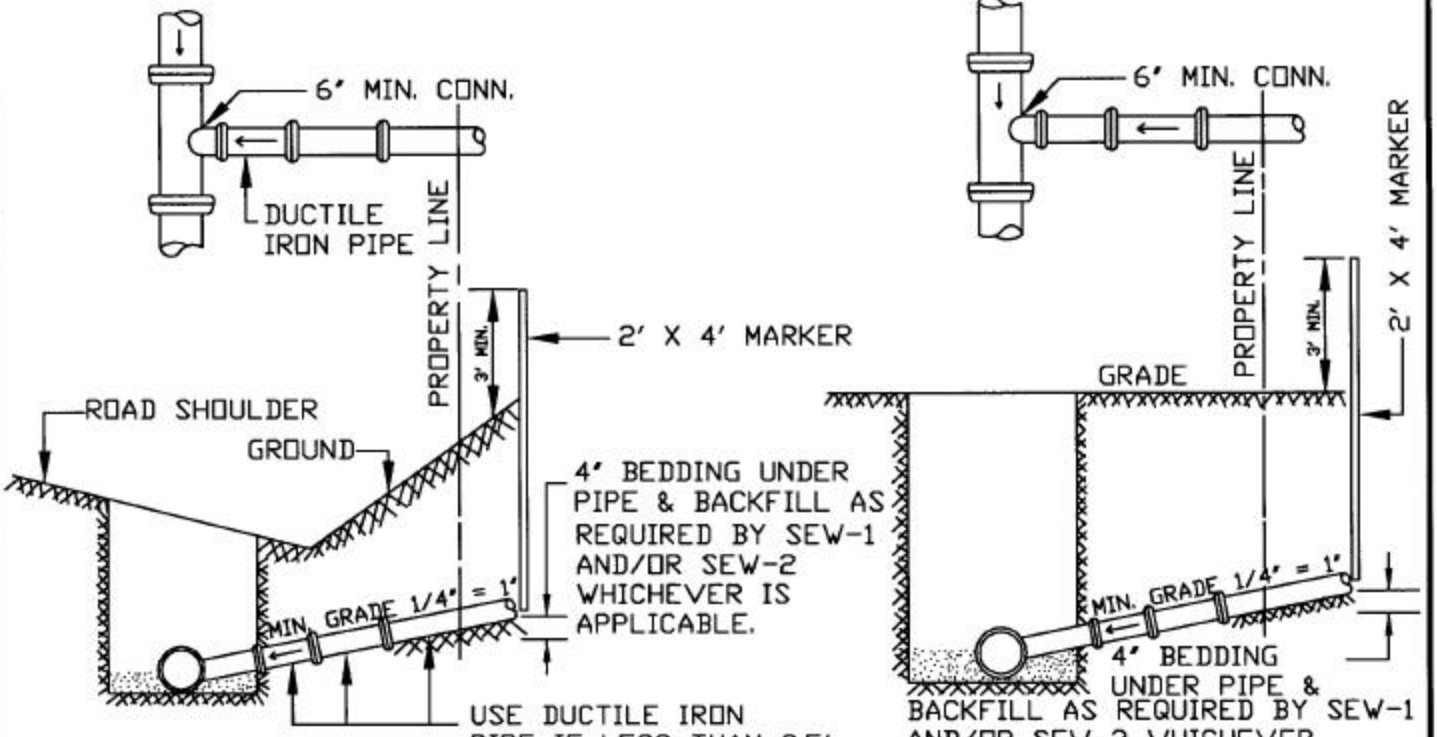
SECTION

NOTE: PAINT EXPOSED PORTION OF PIPE WITH GREEN RUST INHIBITIVE PAINT.

NOTE: WHERE MANHOLE IS LOCATED IN FLOOD PLAIN, AIR VENT SHALL BE SET AT LEAST 12" ABOVE 100 YEAR FLOOD ELEVATION.

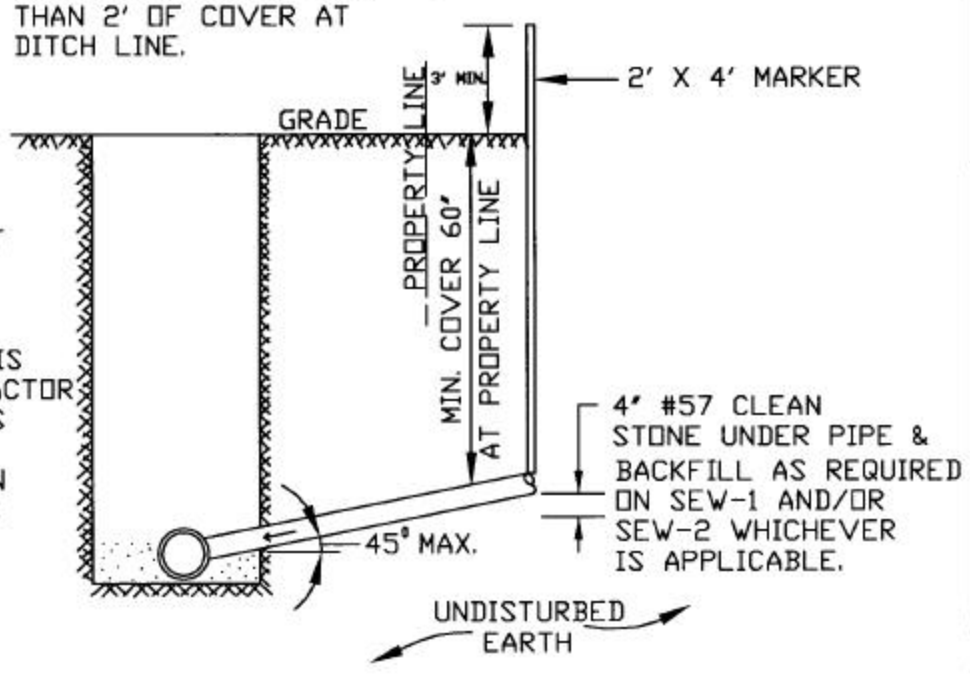
DATE		DRWG. NO.
JAN. 1996	AIR VENT	SEW-3
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE:

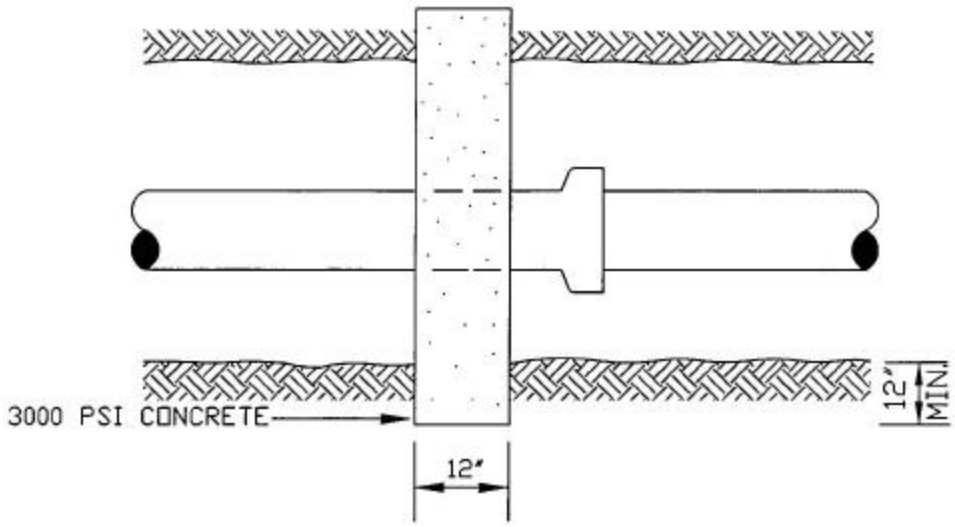
1. HOUSE CONNECTION SHALL BE LAID AT AN ANGLE NOT GREATER THAN 45 FROM HORIZONTAL.
2. WHERE MAIN LINE DEPTH IS GREATER THAN 12', CONTRACTOR SHALL LAY CONNECTION AS SHOWN PROVIDED THE ELEVATION OF CONNECTION AT THE PROPERTY LINE IS SUCH THAT THE LOT IS SERVED PROPERLY.
3. FOR PVC PIPE BEDDING, SEE DETAIL SEW-1.



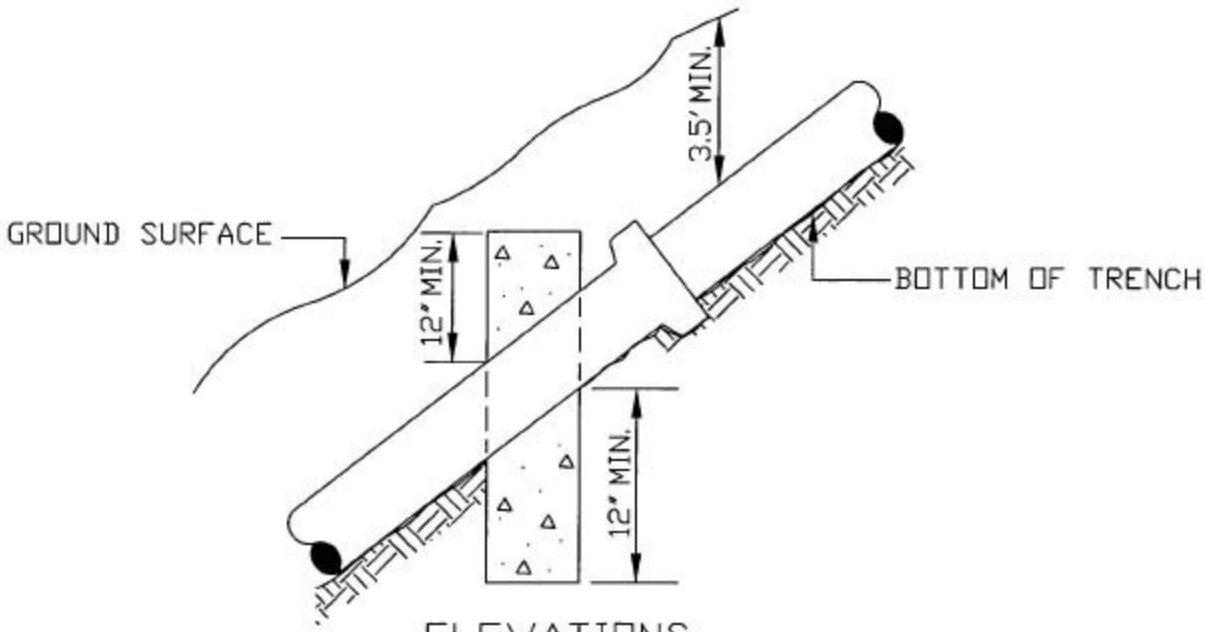
DEEP HOUSE CONNECTION

DATE JAN. 1996	HOUSE CONNECTION DETAILS	DRWG. NO. SEW-4
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLANS

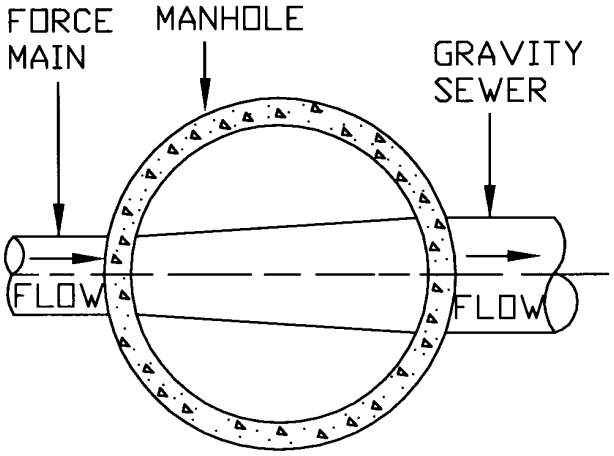


ELEVATIONS

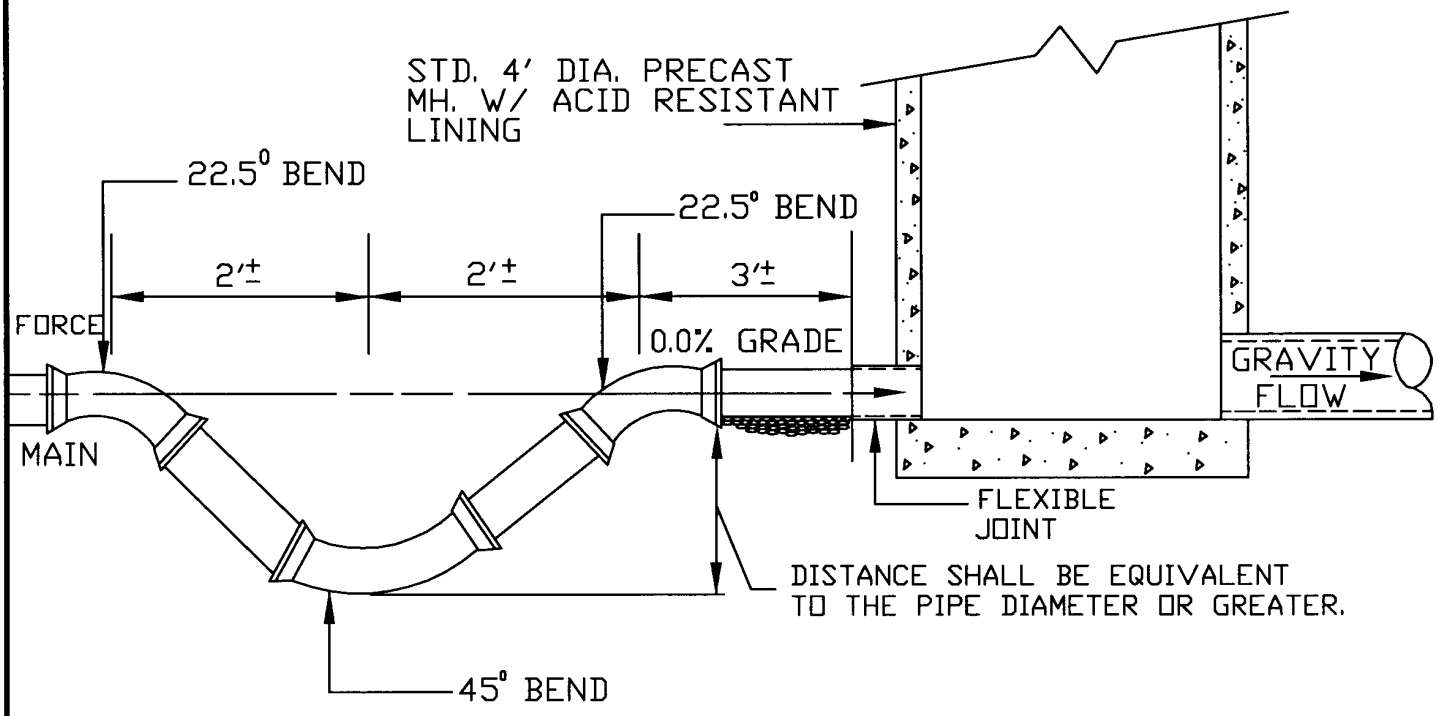
NOTES:
1.) CONCRETE TO BE POURED AGAINST UNDISTURBED EARTH.
2.) SPACING OF ANCHORS:
SLOPES : 20%-30% - EVERY 2 LENGTHS OF PIPE
30%-50% - EVERY 1 1/2 LENGTHS OF PIPE
OVER 50% - EVERY LENGTH OF PIPE

DATE	SEWER ANCHORAGE IN SLOPES GREATER THAN 20%	DRWG. NO.
JAN. 1996		SEW-5
REVISIONS MARCH 1998		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PLAN

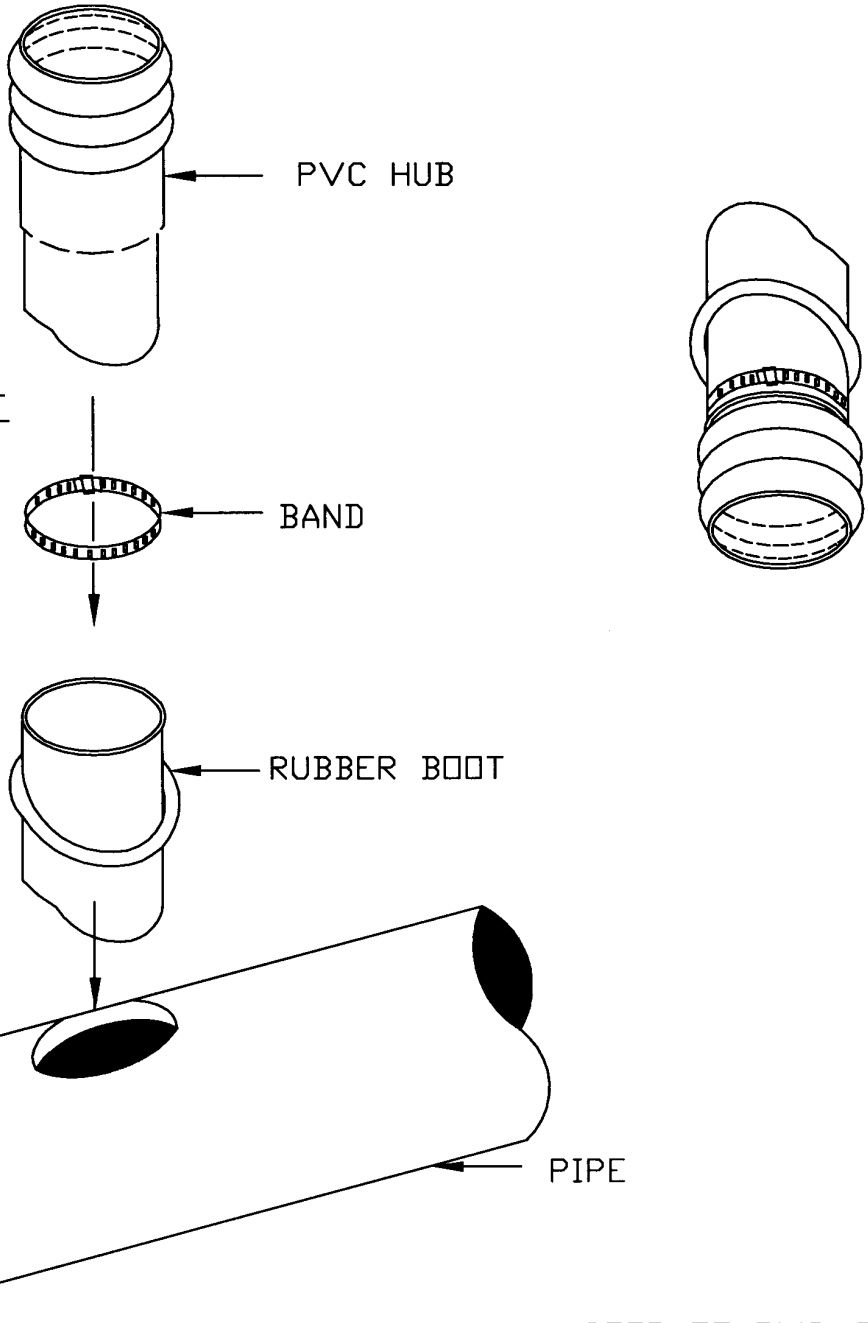


SECTION

NOTE: VENT SHALL BE AS SEW-3.

DATE JAN. 1996	FORCE MAIN DISCHARGE	DRWG. NO. SEW-6
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

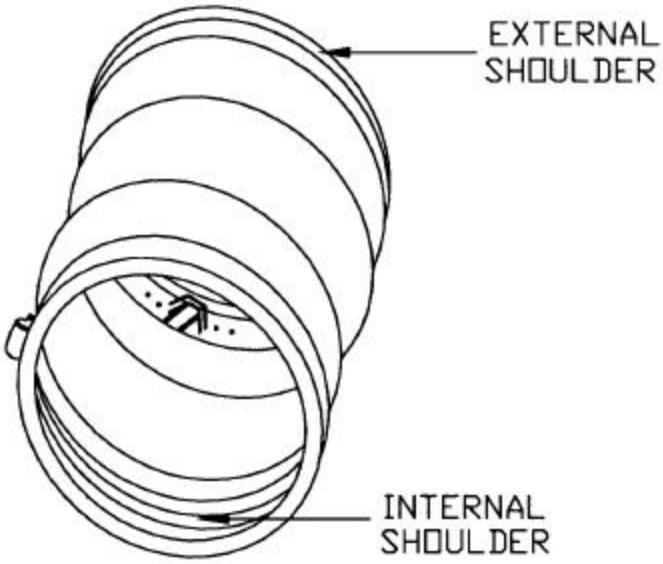


NOTE:
THIS METHOD OF CONNECTION SHALL NOT TAKE PRECEDENT OVER USING TEES. THE APPLICATION SHOWN HERE IS FOR TAPPING EXISTING MAINS.

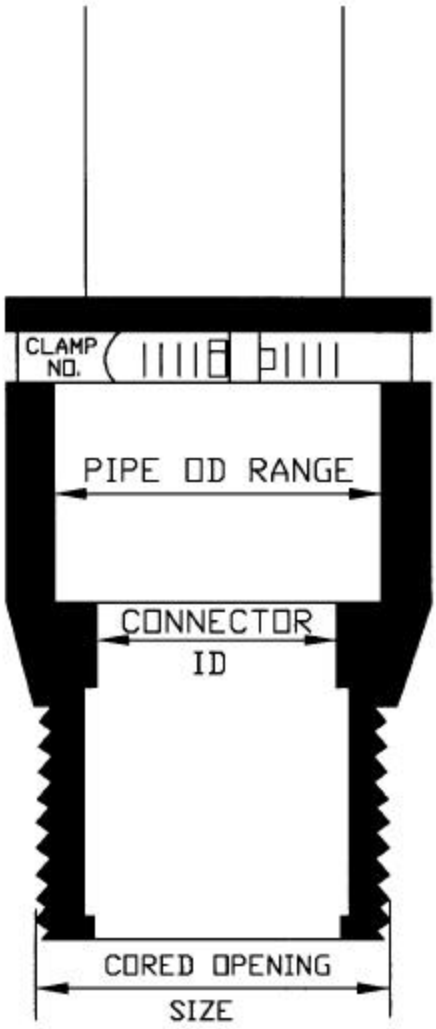
NOTE: INSERT-A-TEE CAN BE CONNECTED TO PVC, PERMA-LOC, SPIROLITE, SLIP LINER, DUCTILE IRON, THIN WALL MAIN LINES, CONCRETE (MAINLINES AND MANHOLES), CLAY, ALL THICK WALLED MAIN LINES. IT IS A THREE PIECE CONNECTION THAT IS COMPRESSION-FIT INTO THE CORED WALL OF THE MAIN LINE. IT CONSISTS OF SIDE SERVICES OF 4" THROUGH 12" AND FITS ALL MAIN LINE DIAMETER.

DATE JAN. 1996	INSERTA TEE	DRWG. NO. SEW-7
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



KOR-N-TEE CONNECTOR

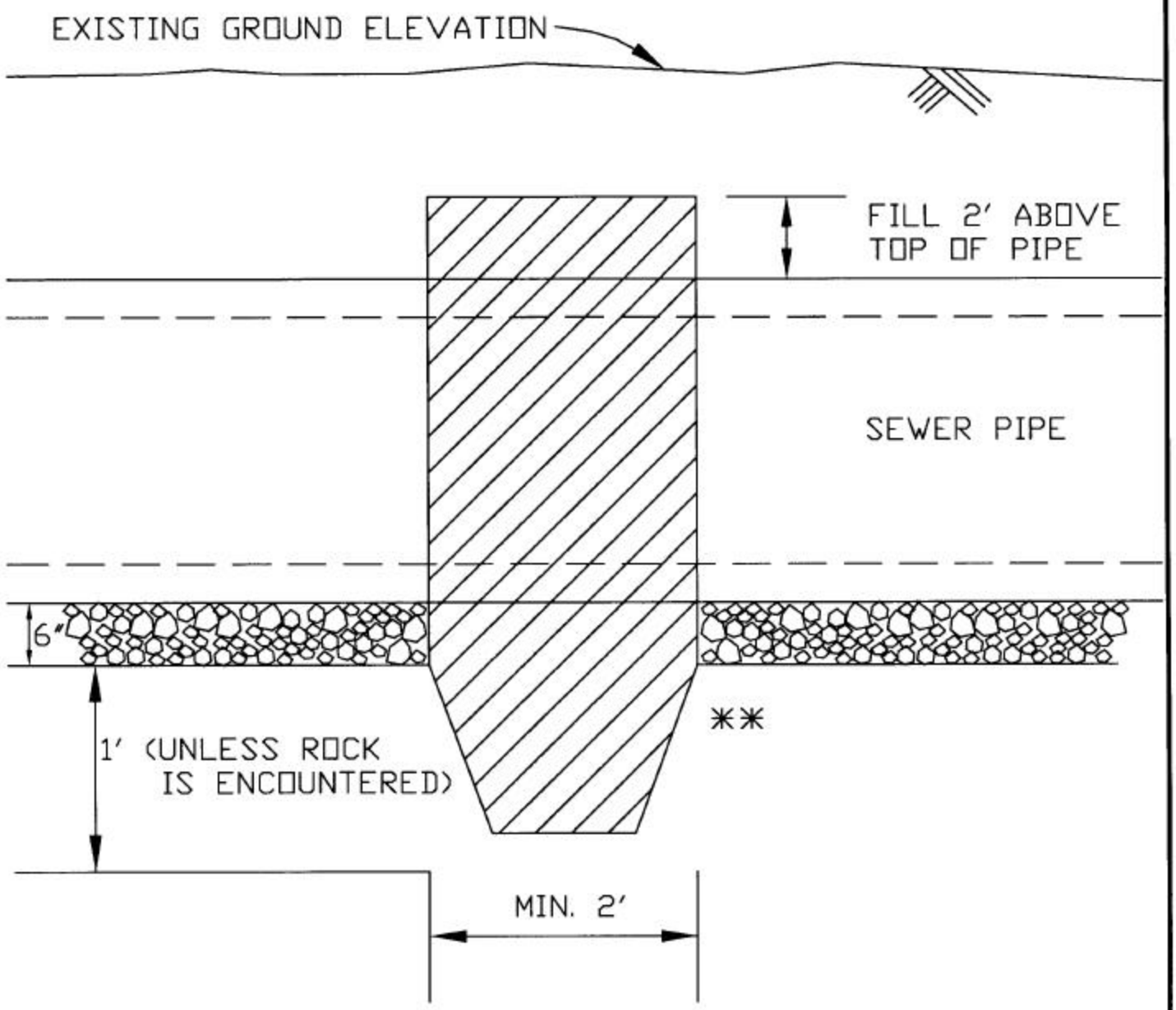


CROSS SECTION

NOTE: IT CAN BE USED FOR INCOMING PIPE SIZES 3.5" O.D. TO 9.875" O.D. THE EXTERNAL SHOULDER PREVENTS THE CONNECTOR FROM PROTRUDING INTO THE TRUNK OR MAIN LINE. THE INTERNAL SHOULDER IN THE CONNECTOR PREVENTS THE INCOMING PIPE OR LATERAL FROM BEING PUSHED THROUGH THE KOR-N-TEE CONNECTOR AND PROTRUDING INTO THE TRUNK OR MAIN LINE. IT MAKES A PERMANENT CONNECTION FOR ALL MATERIALS INCLUDING PVC, FIBERGLASS, ETC

DATE JAN. 1996	KOR-N-TEE	DRWG. NO. SEW-8
REVISIONS		

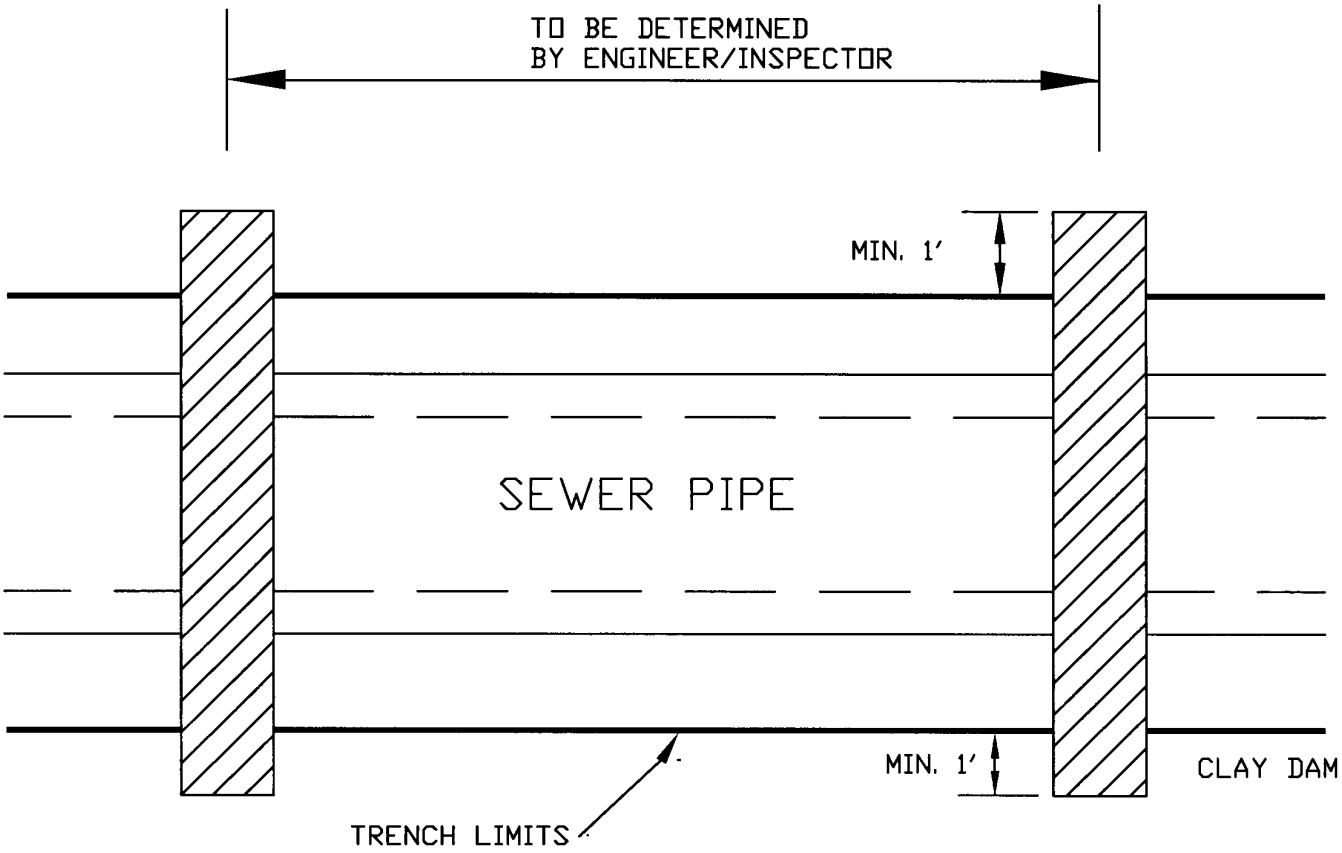
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



** CLAY DAM (MIN. IMPERVIOUSNESS=10^{-3} CM/SEC)
*ALTERNATE MATERIALS INCLUDE SOIL MIXED WITH CEMENT AND CONCRETE.
(MATERIALS TO BE APPROVED BY ENGINEER PRIOR TO PLACING.)

DATE		DRWG. NO.
JAN. 1996	CLAY DAM DETAIL	SEW-9
REVISIONS		SHT. 1 OF 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



DATE		
JAN. 1996	CLAY DAM DETAIL	DRWG. NO.
REVISIONS	PLAN VIEW	SEW-9
		SHT. 2 OF 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS

DEPTH (FT)	DIAMETER, (IN.)								
	30	33	36	42	48	54	60	66	72
	TIME, (SEC.)								
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	39	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

NOTE

1. THE TEST HEAD SHALL BE PLACED AT THE TOP OF THE MANHOLE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

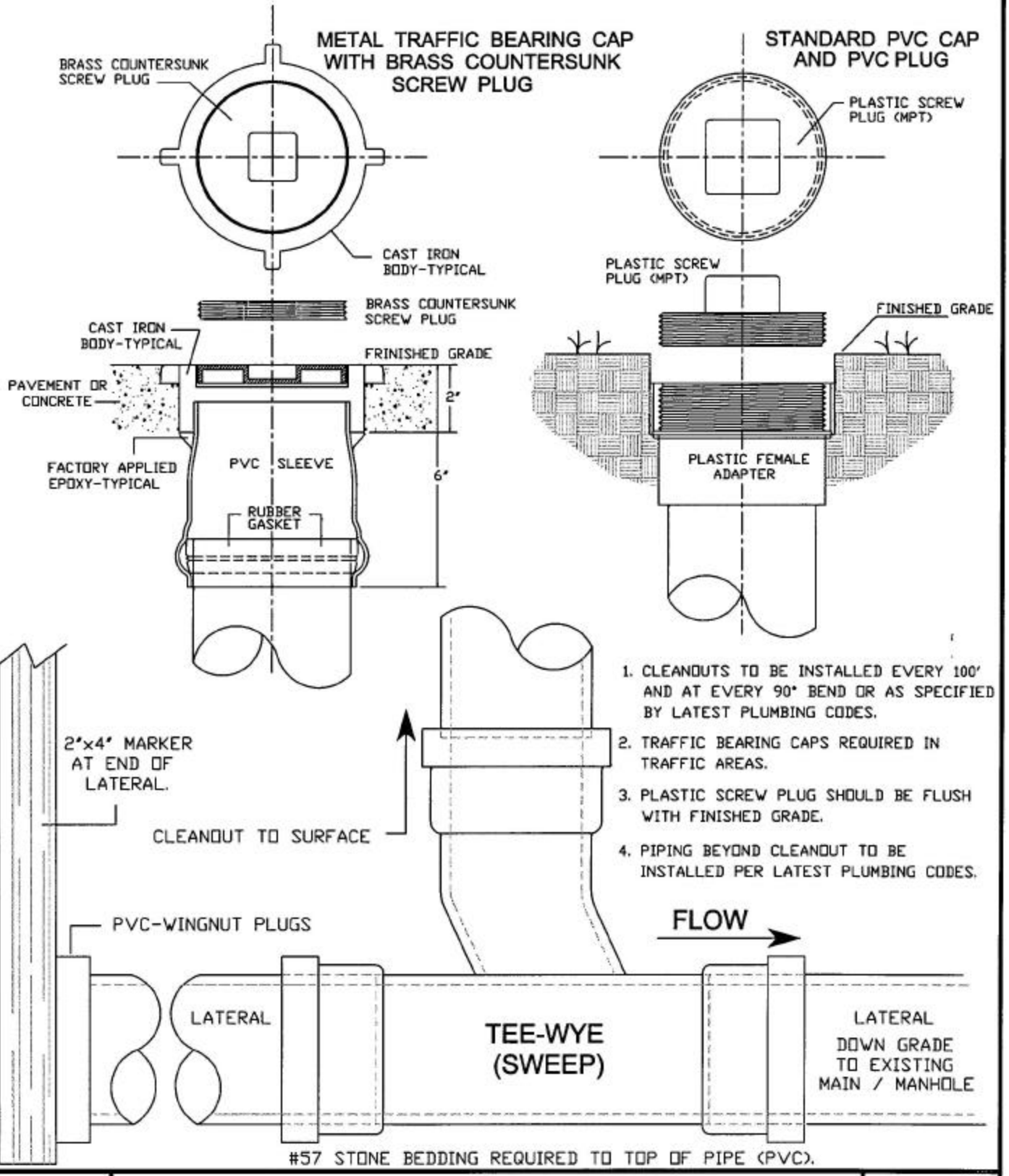
2. A VACUUM OF 10 IN. OF MERCURY SHALL BE DRAWN ON THE MANHOLE, THE VALVE ON THE VACUUM LINE OF THE TEST HEAD CLOSED, AND THE THE VACUUM PUMP SHUT OFF. THE TIME SHALL BE MEASURED FOR THE VACUUM TO DROP TO 9 IN. OF MERCURY.

3. THE MANHOLE SHALL PASS IF THE TIME FOR THE VACUUM READING TO DROP FROM 10 IN. OF MERCURY TO 9 IN. OF MERCURY MEETS OR EXCEEDS THE VALUES INDICATED IN TABLE 1.

4. IF THE MANHOLE FAILS THE INITIAL TEST, NECESSARY REPAIRS SHALL BE MADE BY AN APPROVED METHOD. THE MANHOLE SHALL THEN BE RETESTED UNTIL A SATISFACTORY TEST IS OBTAINED.

DATE JAN. 1996	VACUUM TEST (ASTM C 1244) FOR CONCRETE SEWER MANHOLES	DRWG. NO. SEW-10
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



1. CLEANOUTS TO BE INSTALLED EVERY 100' AND AT EVERY 90° BEND OR AS SPECIFIED BY LATEST PLUMBING CODES.
2. TRAFFIC BEARING CAPS REQUIRED IN TRAFFIC AREAS.
3. PLASTIC SCREW PLUG SHOULD BE FLUSH WITH FINISHED GRADE.
4. PIPING BEYOND CLEANOUT TO BE INSTALLED PER LATEST PLUMBING CODES.

DATE JAN. 2003	CLEANOUT DETAIL	DRWG. NO. SEW-11
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

WASTEWATER SYSTEMS 48″ AND LARGER

PIPE DIAMETER	ALLOWABLE INFILTRATION/EXFILTRATION (GAL./HOUR/100 FT.)	(QT./MIN./100 FT.)
48″	1.894	0.1263
54″	2.131	0.1421
60″	2.367	0.1578
66″	2.604	0.1736
72″	2.841	0.1894
84″	3.314	0.2209

DATE		DRWG. NO.
JAN. 1996	ALLOWABLE INFILTRATION/EXFILTRATION BASED ON 50 GAL./IN. DIA./MILE/24 HRS.	TST-1
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED PRESSURE DROP FROM 3.5 PSIF TO 2.5 PSIG*

PIPE DIAMETER (IN.)	MINIMUM TIME (MIN: SEC)	TIME FOR LENGTH (L) (SEC)	SPECIFICATION TIME FOR LENGTH (L) SHOWN (MIN:SEC)							
			100 FT.	150 FT.	200 FT.	250 FT.	300 FT.	350 FT.	400 FT.	450 FT.
6	5:40	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	45:21	41.883 L	69:48	104:47	139:37	174:31	209:25	244:19	279:13	314:07

*The 3.5 psig test pressure shall be increased by adding the average vertical height in feet of ground water above the sewer pipe invert, didived by 2.31 but the maximum starting test pressure shall not exceed 9 psig.

DATE JAN. 1996	PVC PIPE AIR TEST TABLE	DRWG. NO.
REVISIONS	BASED ON FORMULAS FROM UNI-B-6-90	TST-2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

MINIMUM TEST TIME TWO HOURS

WATER LINE TEST BASED ON 150 PSI	
SIZE	MAX. ALLOWABLE LEAKAGE
3/4"	.0138 (GAL/2 HRS)/100 L.F.
1"	.0184 (GAL/2 HRS)/100 L.F.
1 1/2"	.0276 (GAL/2 HRS)/100 L.F.
2"	.0368 (GAL/2 HRS)/100 L.F.
3"	.0552 (GAL/2 HRS)/100 L.F.
4"	.0736 (GAL/2 HRS)/100 L.F.
6"	.1103 (GAL/2 HRS)/100 L.F.
8"	.1471 (GAL/2 HRS)/100 L.F.
12"	.2207 (GAL/2 HRS)/100 L.F.

WATER LINE TEST BASED ON 150 PSI	
SIZE	MAX. ALLOWABLE LEAKAGE
16"	.2942 (GAL/2 HRS)/100 L.F.
20"	.3678 (GAL/2 HRS)/100 L.F.
24"	.4413 (GAL/2 HRS)/100 L.F.
30"	.5517 (GAL/2 HRS)/100 L.F.
36"	.6620 (GAL/2 HRS)/100 L.F.
42"	.7724 (GAL/2 HRS)/100 L.F.
48"	.8827 (GAL/2 HRS)/100 L.F.
54"	.9930 (GAL/2 HRS)/100 L.F.

MAXIMUM ALLOWABLE LEAKAGE FOR THE WATER MAIN WILL BE CALCULATED USING THE FOLLOWING FORMULA:

$$L = \frac{DS\sqrt{P}}{133200}$$

WHERE:

L = MAXIMUM ALLOWABLE LEAKAGE, GALLONS/HOUR
S = LENGTH OF PIPE IN TEST SECTION, IN FEET
D = NOMINAL DIAMETER OF TESTED PIPE, IN INCHES
P = TEST PRESSURE, POUNDS PER SQUARE INCH 150 PSI OR 1 1/2 THE WORKING PRESSURE WHICHEVER IS GREATER MEASURED AT THE HIGH POINT OF THE TEST SYSTEM.

DATE	ALLOWABLE LEAKAGE TABLE – WATER LINES	DRWG. NO.
JAN. 1996	BASED ON FORMULAS FROM AWWA SPECIFICATIONS	TST-3
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

CONCRETE SEWER LINES LOW-PRESSURE AIR TEST

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED
PRESSURE DROP FROM 3.5 PSIG TO 2.5 PSIG*

PIPE DIAMETER (IN.)	MINIMUM TIME (MIN:SEC)	TIME FOR LENGTH (L) (SEC)	SPECIFICATION TIME FOR LENGTH (L) SHOWN (MIN:SEC)							
			100 FT	150 FT	200 FT	250 FT	300 FT	350 FT	400 FT	450 FT
18	2:24	1.44 L	2:24	3:36	4:48	6:00	7:12	8:24	9:36	10:48
21	3:00	1.80 L	3:00	4:30	6:00	7:30	9:00	10:30	12:00	13:30
24	3:48	2.28 L	3:47	5:42	7:36	9:30	11:24	13:18	15:12	17:06

*THE 3.5 PSIG TEST PRESSURE SHALL BE INCREASED BY ADDING THE AVERAGE VERTICAL HEIGHT IN FEET OF GROUND WATER ABOVE THE SEWER PIPE INVERT, DIVIDED BY 2.31 BUT THE MAXIMUM STARTING TEST PRESSURE SHALL NOT EXCEED 9 PSIG.

JOINT ACCEPTANCE TEST FOR CONCRETE SEWER LINES 27" AND LARGER IN DIAMETER

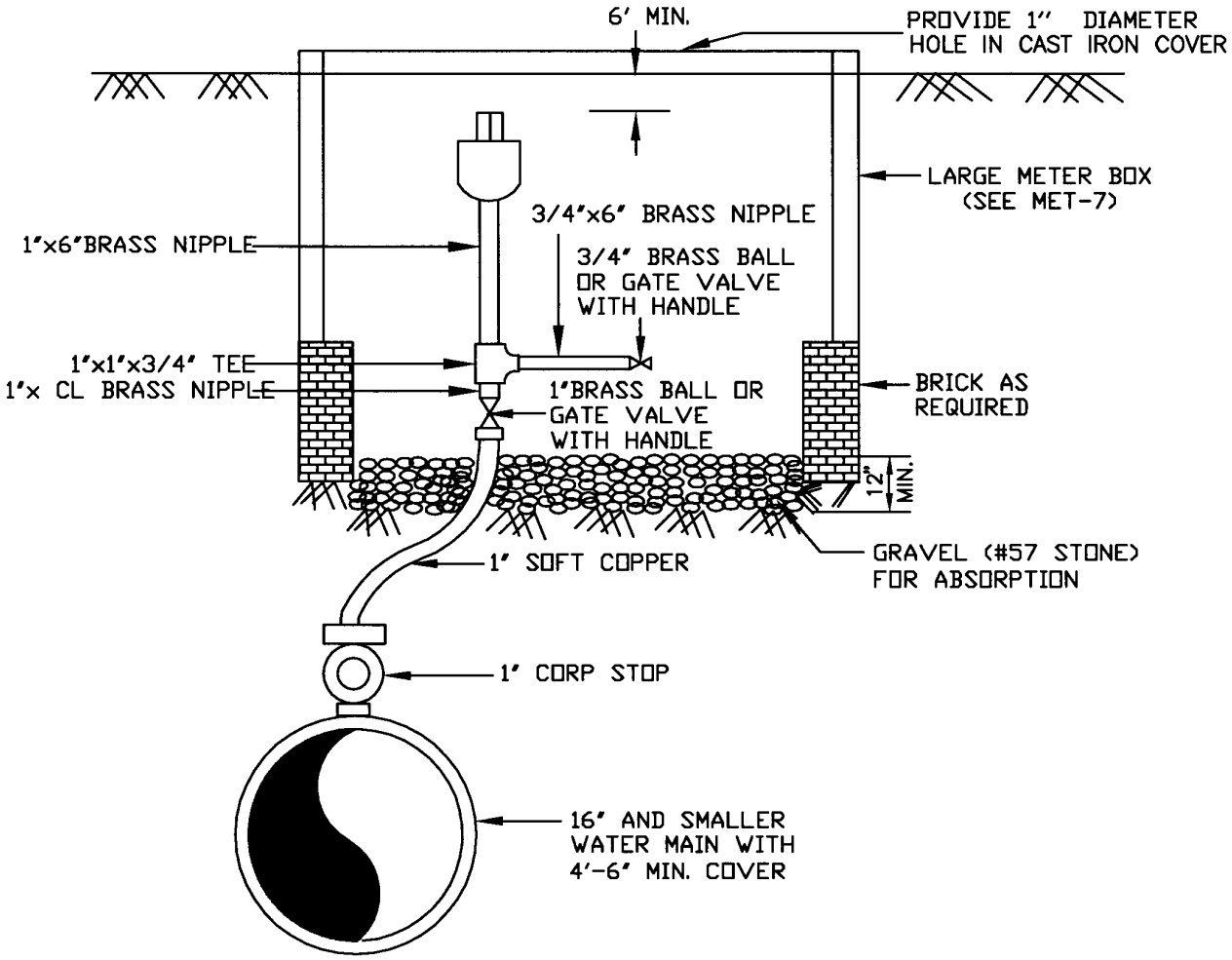
1. PRESSURIZE THE JOINT WITH AIR TO 3.5 PSI GREATER THAN THE PRESSURE EXERTED BY GROUND WATER ABOVE THE PIPE. ALLOW THE AIR PRESSURE AND TEMPERATURE TO STABILIZE BEFORE SHUTTING OFF THE AIR SUPPLY.

2. IF THE PRESSURE HOLDS, OR DROPS LESS THAN 1 PSI IN 5 SECONDS, THE JOINT IS ACCEPTABLE.

NOTE: FOR EVERY FOOT OF GROUND WATER ABOVE THE SPRING LINE ADD 0.43 PSI TO THE TEST PRESSURE. IF THE PRESSURE REQUIRED FOR THE TEST EXCEEDS 6 PSIG, USE THE INFILTRATION TEST.

DATE JAN. 1996	AIR TEST TABLE BASED ON FORMULA FROM ASTM C924 AND ASTM C1103	DRWG. NO. TST-4
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

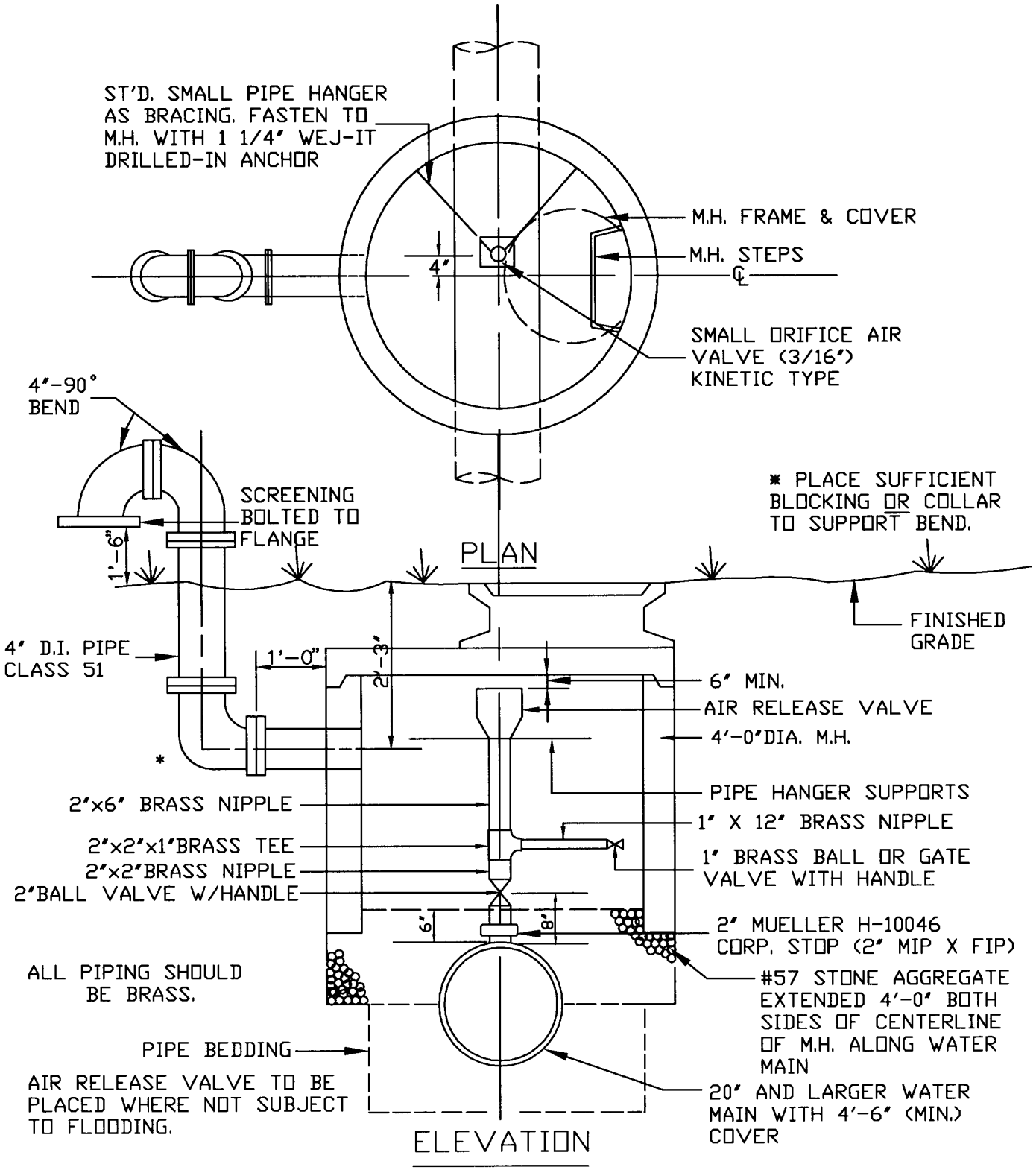


NOTE:

1. IT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER TO DESIGN THE PUBLIC WATER SYSTEM TO MINIMIZE THE NUMBER OF AIR RELEASE VALVES BY ELIMINATING HIGH POINTS WHERE REASONABLY FEASIBLE AND TO PROPERLY SIZE THE AIR RELEASE VALVE TAKING INTO CONSIDERATION ALL THE DESIGN FACTORS, AND KEEPING IN MIND THAT A 1" AIR RELEASE VALVE FOR 16" WATER LINES IS DESIRABLE. ORIFICE SIZE SHALL BE NOTED ON PLANS.
2. ALL COPPER FITTINGS WILL BE FLARE OR COMPRESSION TYPE.
3. SADDLE MUST BE USED IF TAP IS MADE IN PVC.
4. WHERE THE AIR RELEASE VALVE IS REMOTE FROM THE WATER LINE THERE MUST BE CONTINUOUS RISE IN THE COPPER SUPPLY LINE TO THE AIR RELEASE VALVE AND NO TRAP SHALL BE PERMITTED.
5. AIR RELEASE VALVE TO BE PLACED WHERE NOT SUBJECT TO FLOODING.

DATE JAN. 1996	1" RELEASE VALVE	DRWG. NO. WAT-1
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

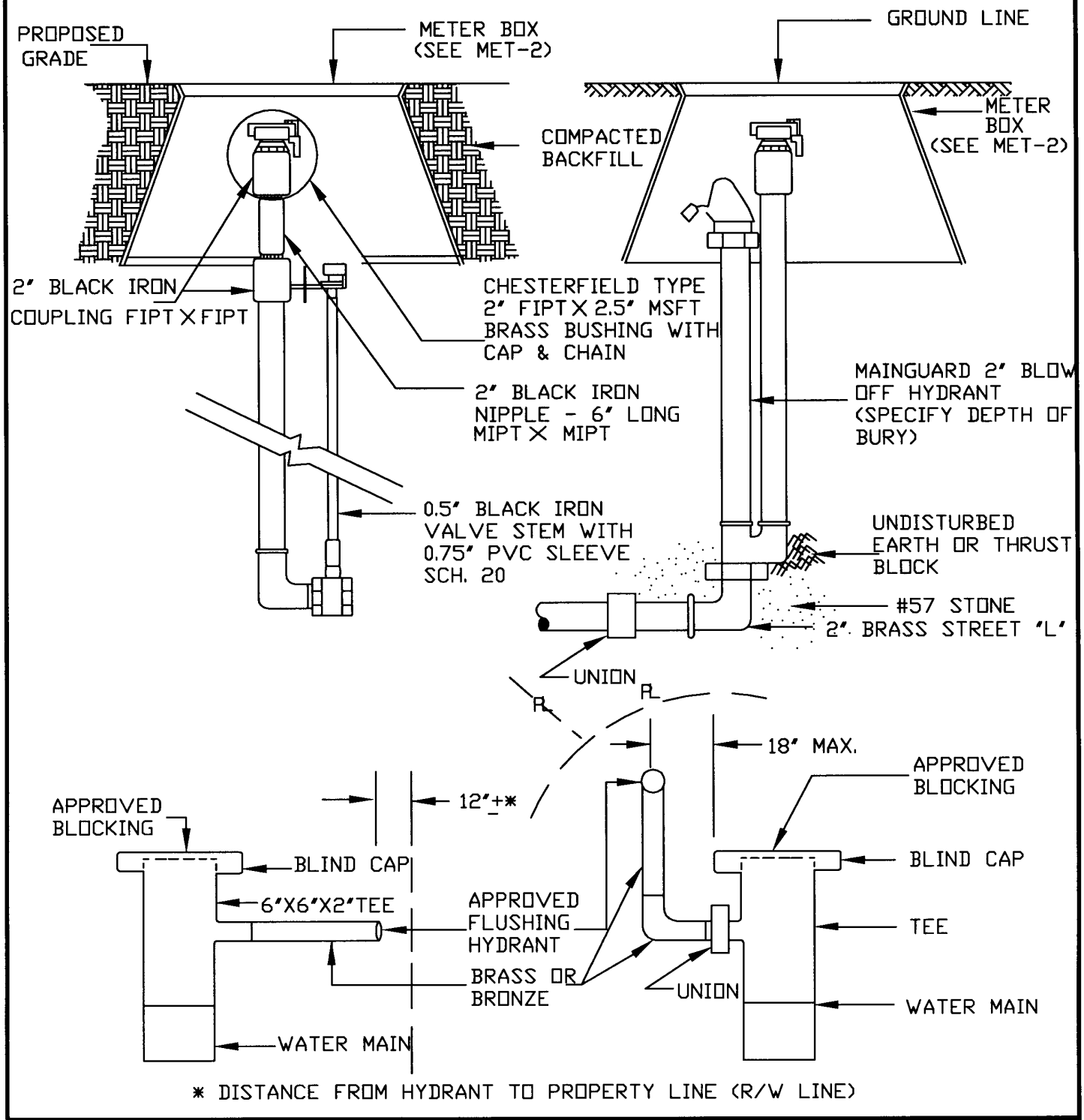


DATE		DRWG. NO.
JAN. 1996	2" AIR RELEASE VALVE ASSEMBLY	WAT-2
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

AQUARIUS 103 CHESTERFIELD 2"
FLUSHING HYDRANT PART #CHSFLD30

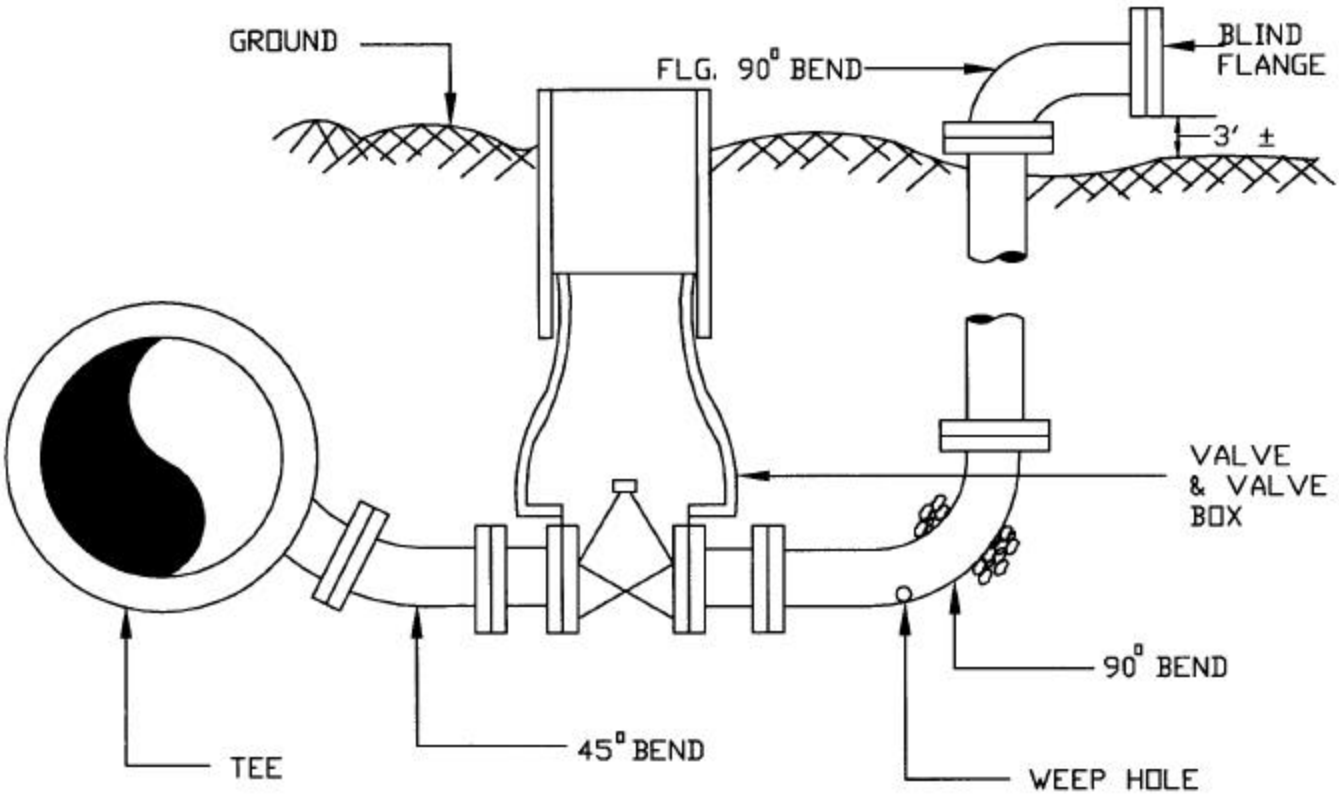
INSTALLATION DETAIL MAINGUARD
78 BLOW-OFF HYDRANT
(MODIFIED)



* DISTANCE FROM HYDRANT TO PROPERTY LINE (R/W LINE)

DATE	FLUSHING HYDRANT (BLOW-OFF)	DRWG. NO.
JAN. 1996		WAT-3
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

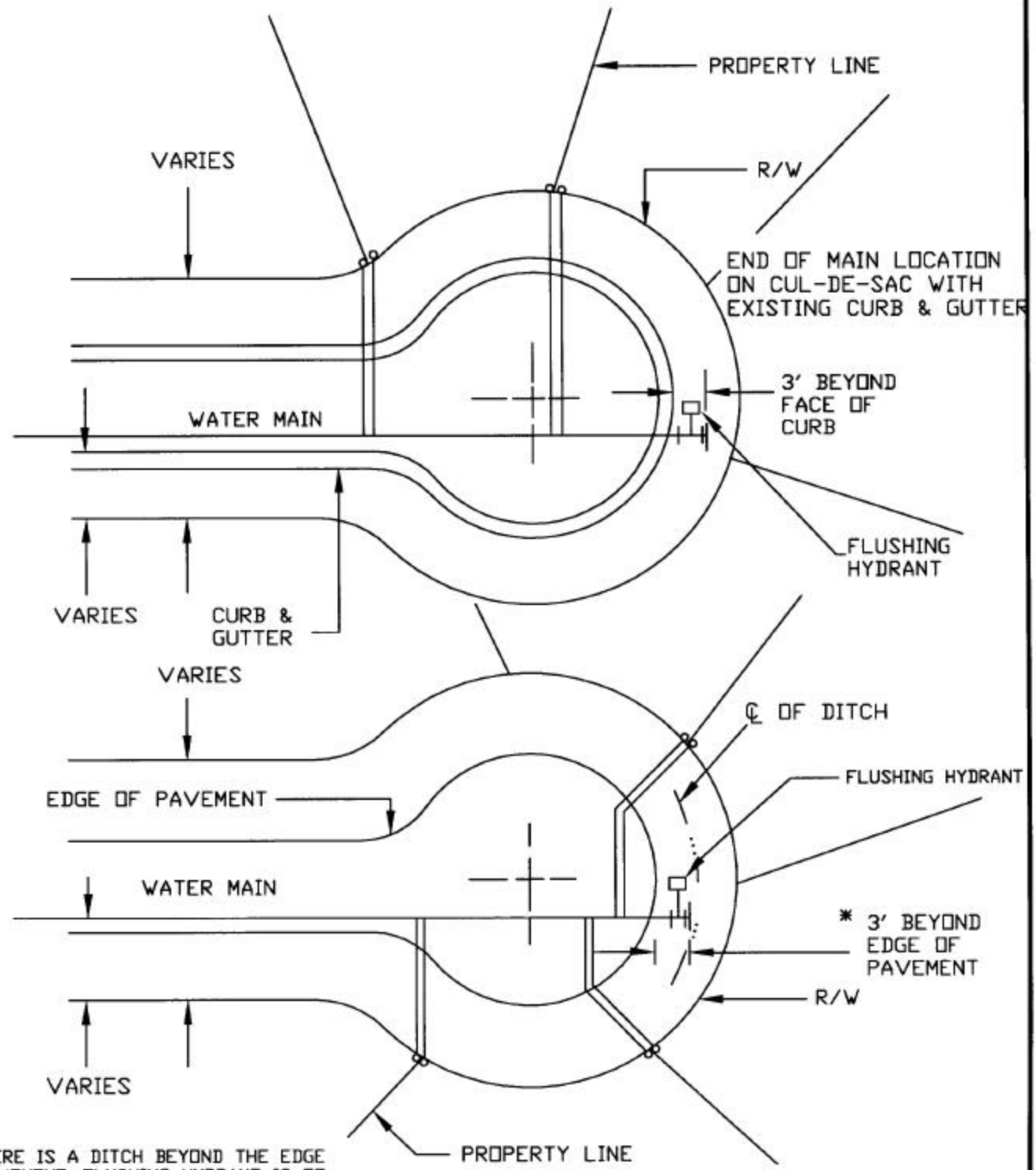


NOTE:

1. THE LARGE BLOW-OFF SHALL BE DRAINED TO PREVENT FREEZING.
2. ALL PIPE AND FITTINGS SHALL BE FLANGED OR M.J. RESTRAIN JOINTS.
3. WEEP HOLE TO BE CUT/DRILLED 2' BELOW GROUND LEVEL TO SUFFICIENTLY ALLOW STAND PIPE TO DRAIN. BACKFILL WITH AT LEASE 1/2 CUBIC YARD OF CLEAN STONE.

DATE JAN. 1996	TYPICAL 4" AND LARGER BLOW-OFF	DRWG. NO. WAT-4
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



* IF THERE IS A DITCH BEYOND THE EDGE OF PAVEMENT, FLUSHING HYDRANT IS TO BE PLACED BETWEEN THE DITCH AND RIGHT OF WAY LINE ON LEVEL GROUND. IF THIS IS NOT POSSIBLE, CONSULT THE UTILITY CONSTRUCTION INSPECTOR.

END OF MAIN LOCATION ON UNIMPROVED CUL-DE-SAC WITH OR WITHOUT FUTURE CURB AND GUTTER.

DATE	TYPICAL WATER MAIN LOCATION ON CUL-DE-SAC	DRWG. NO.
JAN. 1996		WAT-5
REVISIONS		

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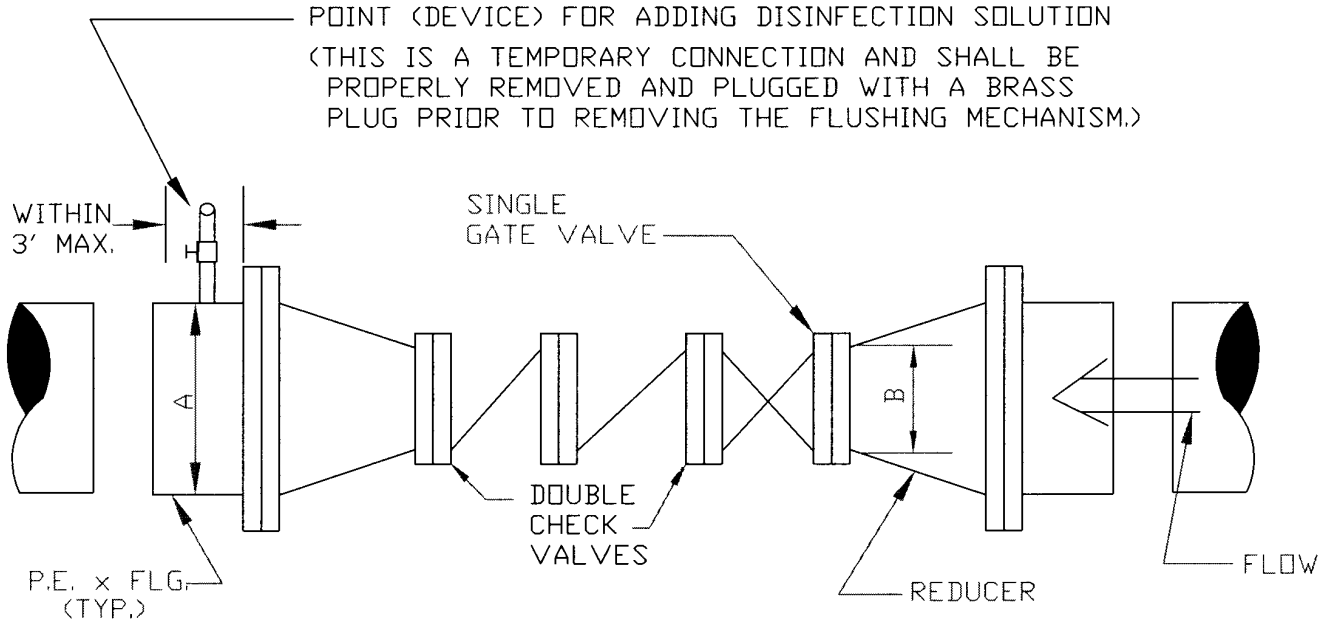
DEPARTMENT OF PUBLIC UTILITIES



A	B
6"	4"
8"	4"
12"	6"
16"	6"
20"	8"
24"	12"
30"	*
36"	*

* TO BE DESIGNED BY CONSULTANT.

A = MAIN SIZE

B = CHECKVALVE AND GATE VALVE SIZE

NOTE: CONTRACTOR SHALL USE IN ACCORDANCE WITH FLUSHING SCHEDULE; SEE PART III & IV (SECTIONS ENTITLED "DISINFECTION SYSTEM" AND "SUPPLEMENTAL PROCEDURES FOR DISINFECTING, TESTING, AND FLUSHING) AND TABLE 1 ENTITLED "FLUSHING SCHEDULE."

DATE	PREASSEMBLED FLUSHING MECHANISM	DRWG. NO.
JAN. 1996		WAT-6
REVISIONS NOV. 1999		

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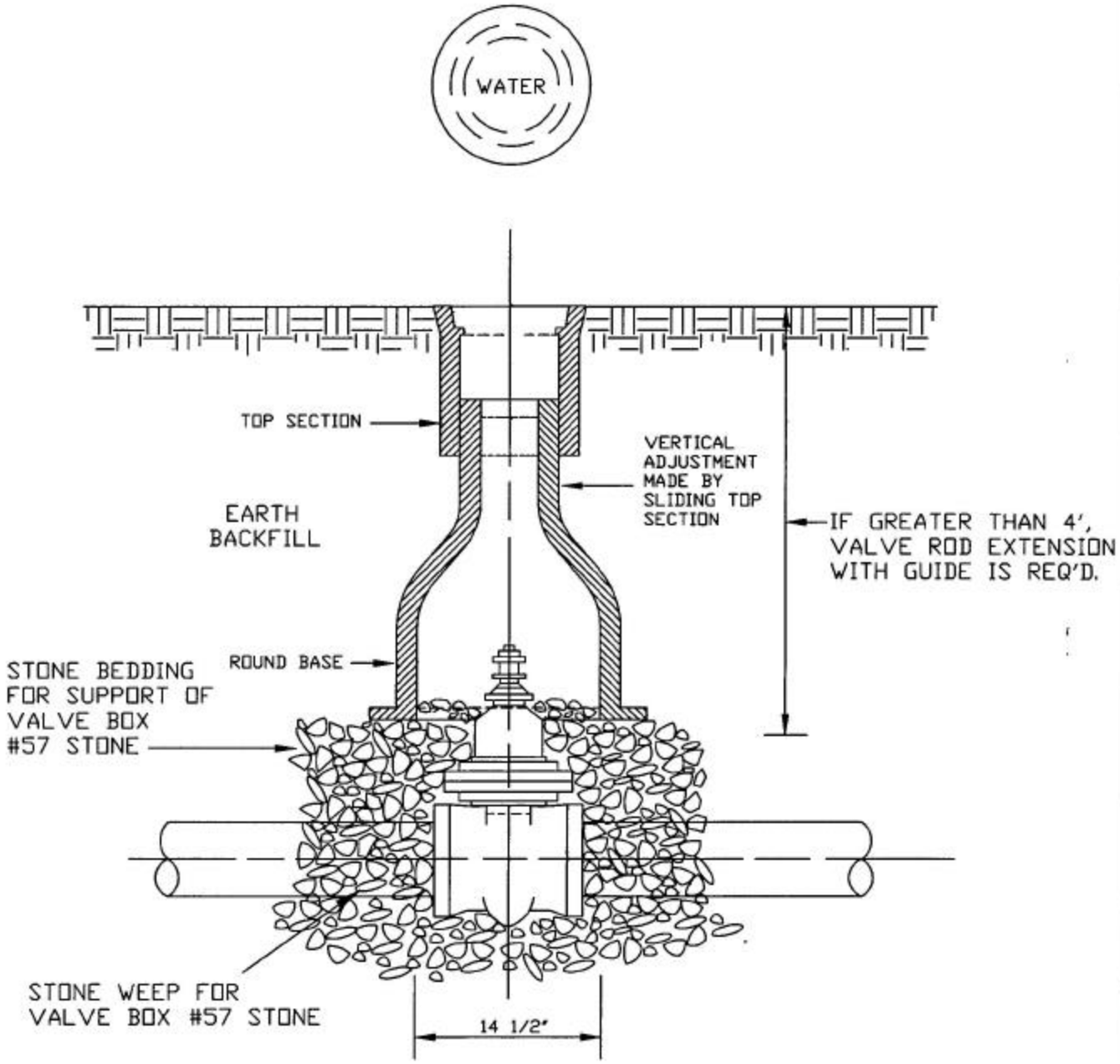
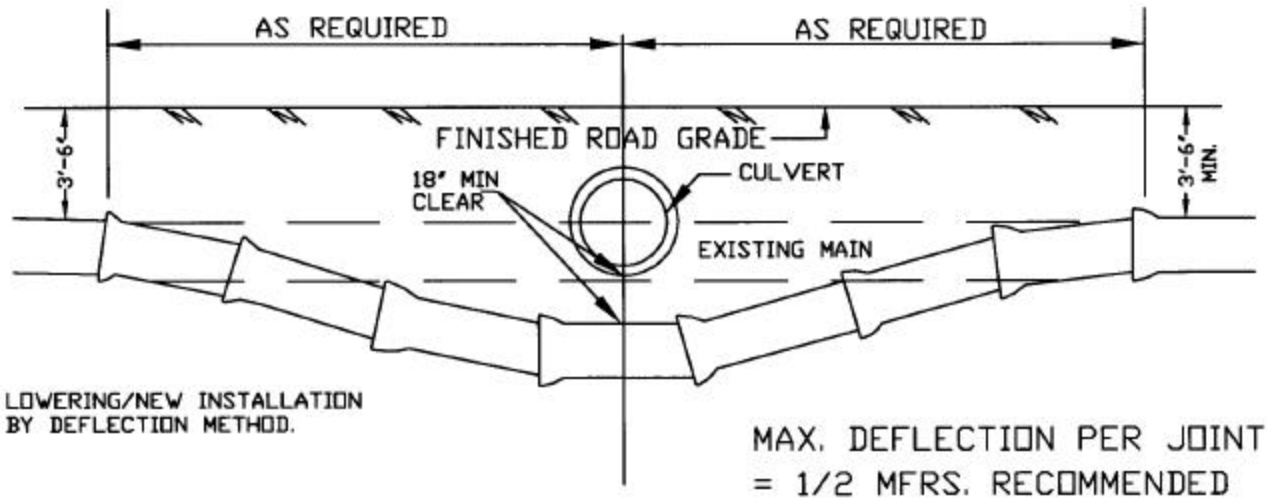
DEPARTMENT OF PUBLIC UTILITIES



USE STANDARD DESIGNED VALVE BOX OF THE APPROPRIATE LENGTH (HEIGHT) UTILIZING APPROVED MANUFACTURERS OF VALVE BOX APPURTENANCES.

DATE		DRWG. NO.
JAN. 1996		
REVISIONS JAN. 2003	SMALL VALVE BOX	WAT-7

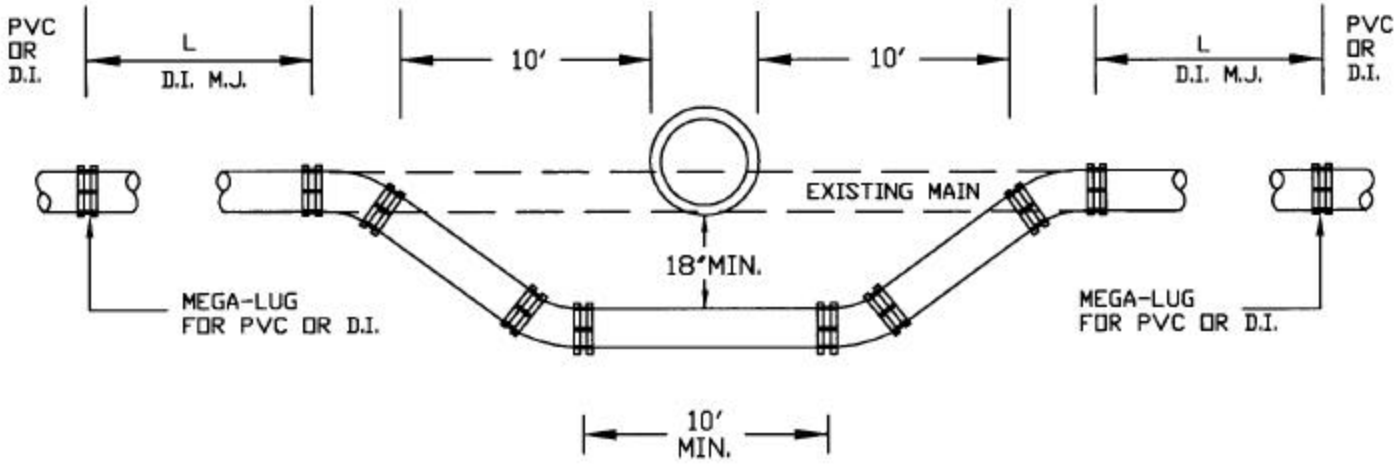
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



LOWERING/NEW INSTALLATION BY DEFLECTION METHOD.

MAX. DEFLECTION PER JOINT = 1/2 MFRS. RECOMMENDED AMOUNT, AS PER WAT-9.

OR



LOWERED SECTION TO BE OF DUCTILE IRON MECHANICAL JOINT PIPE WITH RESTRAINED JOINTS AT ANY INCLUDED JOINTS. THE ENGINEER SHALL CALCULATE LENGTH OF RESTRAINED SECTION.

THRUST BLOCKS FOR VERTICAL BENDS MAY BE DELETED WITH RESTRAINED JOINTS.

DATE JAN. 1996	LOWERING WATER MAIN OR NEW INSTALLATION	DRWG. NO. WAT-8
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

DISCHARGE TABLE FOR HYDRANTS.*+
OUTLET PRESSURE MEASURED BY PITOT GAGE.

FLOWING PRESSURE IN lb/in²	OUTLET DIAMETER IN INCHES											
	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	3 1/8	3 7/8	4	4 3/8	4 1/2	4 5/8
	U.S. GALLONS PER MINUTE											
1	150	170	180	200	220	240	260	400	430	510	540	580
2	210	240	260	290	310	340	370	570	610	720	770	810
3	260	290	320	350	380	420	450	700	740	890	940	990
4	300	340	370	410	440	480	530	810	860	1030	1090	1150
5	340	380	410	450	500	540	590	900	960	1150	1220	1290
6	370	410	450	500	540	590	640	990	1050	1260	1340	1410
7	400	440	490	540	590	640	690	1070	1140	1360	1440	1520
8	430	480	520	570	630	680	740	1140	1220	1450	1540	1620
9	450	500	550	610	670	730	790	1210	1290	1540	1640	1720
10	480	530	580	640	700	760	830	1280	1360	1630	1730	1820
11	500	560	610	670	730	800	870	1340	1430	1710	1810	1910
12	520	580	640	700	770	840	910	1400	1490	1780	1890	1990
13	550	610	670	730	800	870	950	1450	1550	1850	1960	2070
14	570	630	690	760	830	900	980	1510	1610	1920	2040	2150
15	590	650	720	790	860	940	1020	1560	1660	1990	2110	2220
16	610	670	740	810	890	970	1050	1620	1720	2060	2180	2300
17	620	690	760	840	910	1000	1080	1660	1770	2120	2240	2370
18	640	710	780	860	940	1030	1110	1710	1820	2180	2310	2440
19	660	730	810	890	960	1050	1140	1760	1870	2240	2370	2510
20	680	750	830	910	990	1080	1170	1800	1920	2290	2430	2570
22	710	790	870	950	1040	1130	1230	1890	2020	2400	2550	2700
24	740	820	910	1000	1090	1180	1290	1970	2110	2510	2660	2810
26	770	860	940	1040	1130	1230	1340	2050	2190	2620	2770	2930
28	800	890	980	1070	1170	1280	1390	2130	2280	2720	2880	3040
30	830	920	1010	1110	1210	1320	1430	2210	2350	2820	2980	3150
32	860	950	1050	1150	1260	1370	1480	2280	2430	2910	3080	3250
34	880	980	1080	1180	1290	1410	1530	2350	2510	3000	3170	3350
36	910	1010	1110	1220	1330	1450	1580	2420	2580	3080	3260	3440
38	930	1040	1140	1250	1370	1490	1620	2480	2650	3170	3350	3540
40	960	1060	1170	1290	1400	1530	1660	2550	2720	3250	3440	3630

*Computed with coefficient, C = 0.90, to nearest 10 gals. per min.
+From Natl. Bd. of Fire Underwriters.

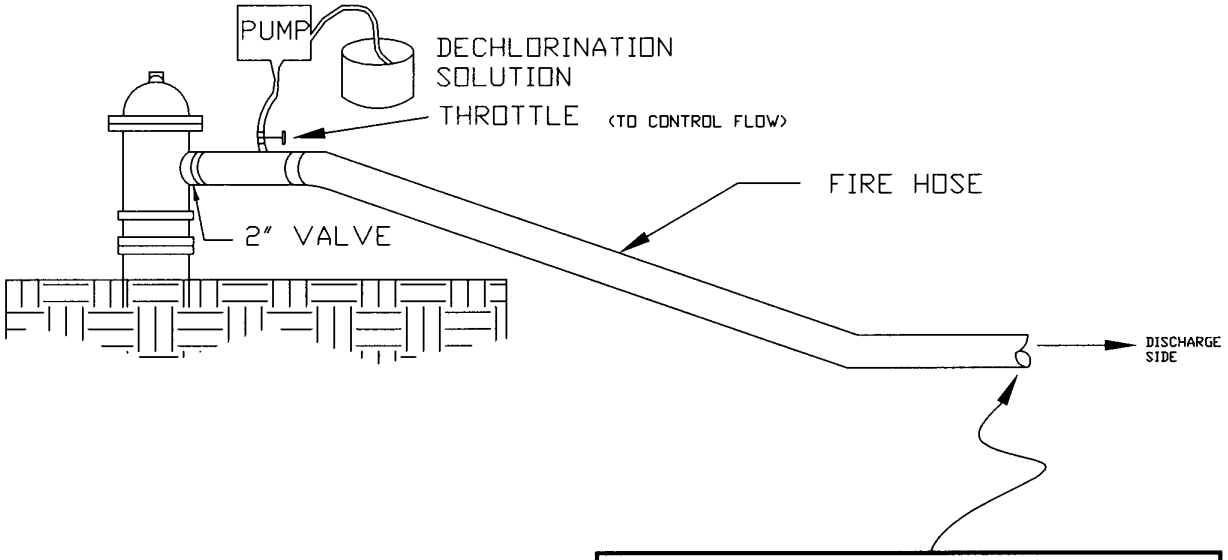
EQUIPMENT FOR APPROXIMATING HYDRANT FLOWS (per R.C. Dennett, Engr. Natl. Bd. of Fire Underwriters):

The equipment necessary consists of either a standard pitot tube or a hydrant cap tapped to take a pressure gage. If the hydrants used as a discharge point for flushing has two or more outlets a pressure gage on one outlet while another outlet is flowing will give approximately the same results as the use of a pitot tube.

DATE JAN. 1996	DISCHARGE FLOW RATES FOR FLUSHING	DRWG. NO. WAT-9
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

PUMP HAS TO HAVE CAPABILITY OF
PUMPING WITH A GREATER PSI THAN THE
PSI OF THE EXISTING SYSTEM.



USE OF A "FLUSHING BAG" (MODEL: ROYAL FLUSH) AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRIC INC. OR APPROVED EQUAL MAY BE USED.

NOTES:

ALL FITTINGS USED MUST BE RESISTANT TO DECHLORINATION CHEMICALS.

THE FIRE HOSE NEEDS TO BE DISCHARGED INTO AN AREA THAT WILL CAUSE NO EVIRONMENTAL/EROSION PROBLEMS. THIS POINT WILL BE MONITORED TO MAKE SURE THAT THE DISCHARGING WATER IS DECHLORINATED.

THIS DETAIL IS A RECOMMENDED DESIGN CONCEPT. ALTERNATE METHOD(S) MAY BE SUBMITTED TO THE UTILITIES DEPARTMENT'S CONSTRUCTION SECTION FOR APPROVAL PRIOR TO SCHEDULED FLUSHING.

DATE JAN. 1996 REVISIONS NOV. 1999	NEUTRALIZATION STATION (DECHLORINATION)	DRWG. NO. WAT-10

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

PIPE MATERIAL TYPE AND SIZE	MAXIMUM DEFLECTION AT EACH JOINT	DEFLECTIONS (INCHES EACH JOINT) 19' LAYING LENGTH	RADIUS (MINIMUM)
DUCTILE IRON (PUSH-ON JOINT)			
6" TO 12"	2° 30'	9.5"	413'
14" TO 16"	2° 00'	7.5"	516'
18" +	1° 30'	5.5"	688'
DUCTILE IRON (MECHANICAL JOINT)			
6"	3° 30'	13.5"	291'
8" TO 12"	3° 00'	11.5"	344'
16"	2° 00'	7.5"	516'
24"	1° 30'	5.5"	688'

Note: Any deflection not listed for iron pipe may be derived by:

$$R = \frac{\frac{90°}{1/2 \text{ Manufacturer's Max. Jt. Deflection}} \times 18' \times 2}{\pi}$$

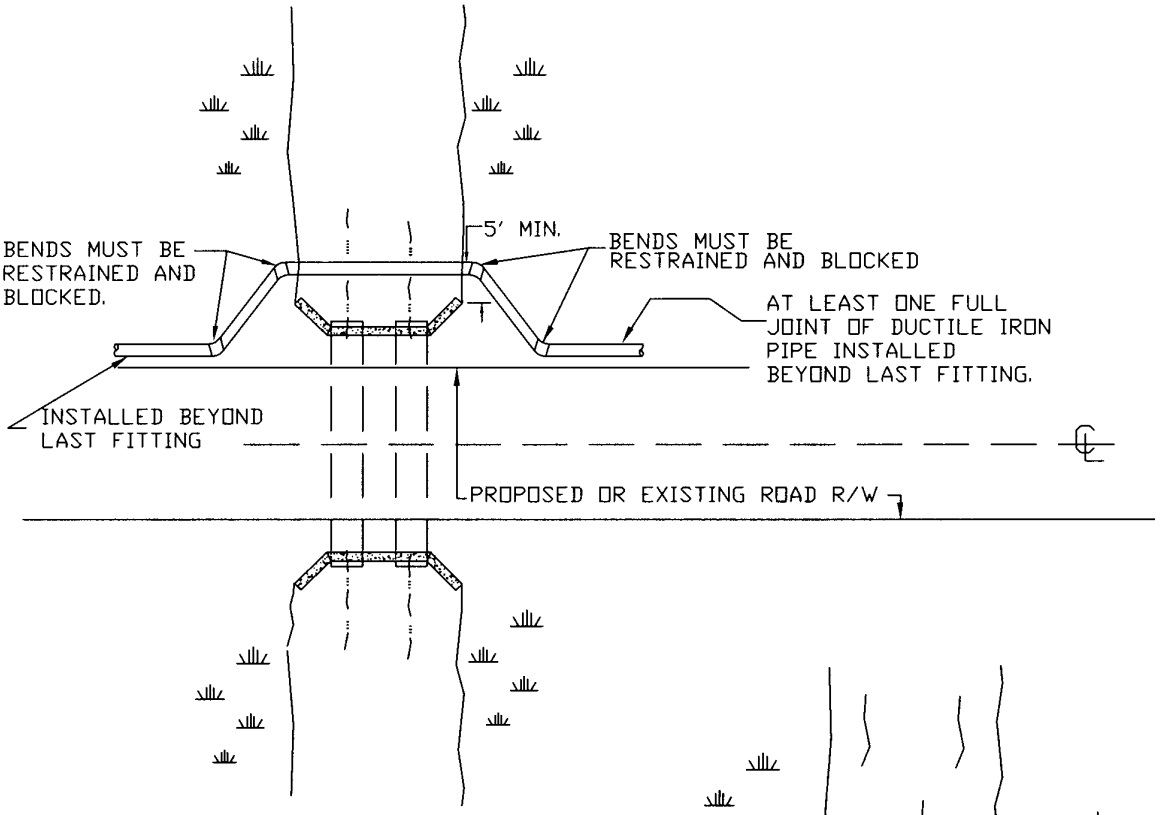
Deflection = tan joint deflection X 18' X 12

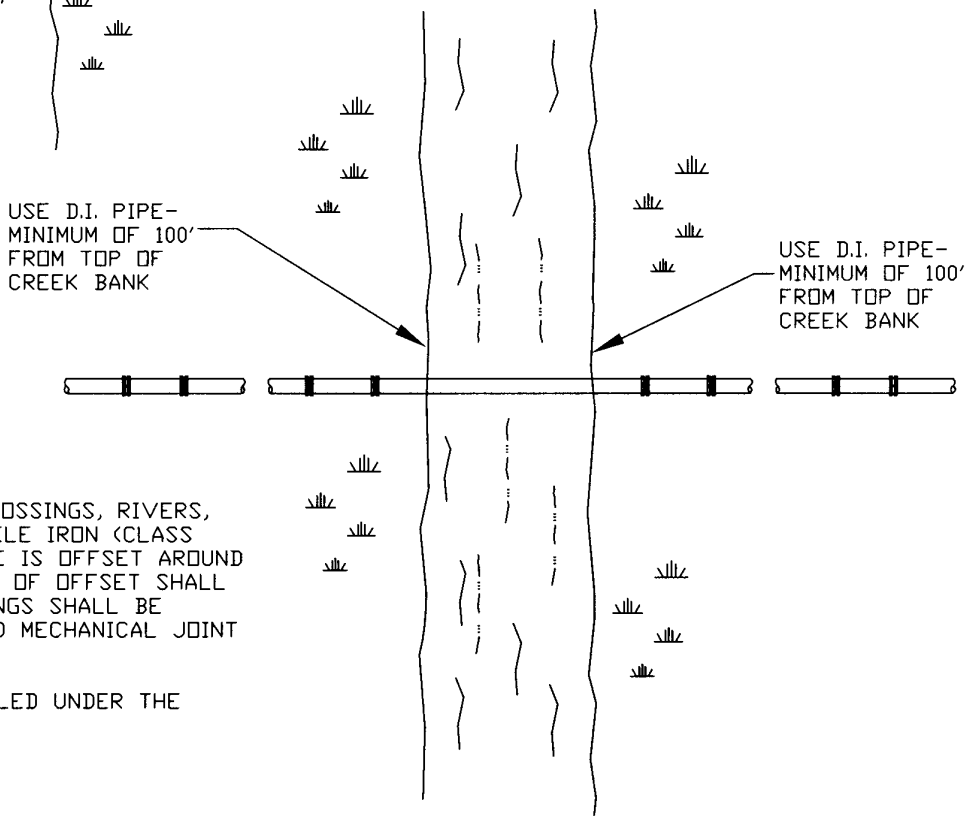
PVC PIPE (C-900, C-905)				
PIPE NOM. DIA.	PIPE O.D.	RADIUS (MIN.)	PRESSURE RATING - DIMENSION RATIO	
6"	6.9"	272.5'	150 psi	DR 18
8"	9.05"	326.3'	150 psi	DR 18
10"	11.10"	377.5'	150 psi	DR 18
12"	13.20"	430.0'	150 psi	DR 18
14"	15.30"	482.5'	165 psi	DR 26
16"	17.40"	535.0'	165 psi	DR 26
18"	19.50"	587.5'	165 psi	DR 26
20"	21.60"	640.0'	165 psi	DR 26
24"	25.80"	745.0'	165 psi	DR 26

Notes:
1. Any radius not listed for PVC pipe may be derived by: Do 300 + 100 (Do = outside diameter in feet)
2. Due to the difficulty of measuring deflections on curved pipe, no deflections are given. It is expected that curved water lines will be properly shown on the plans and staked in the field.

DATE JAN. 1996	ALLOWABLE DEFLECTIONS FOR WATER PIPE	DRWG. NO. WAT-11
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES





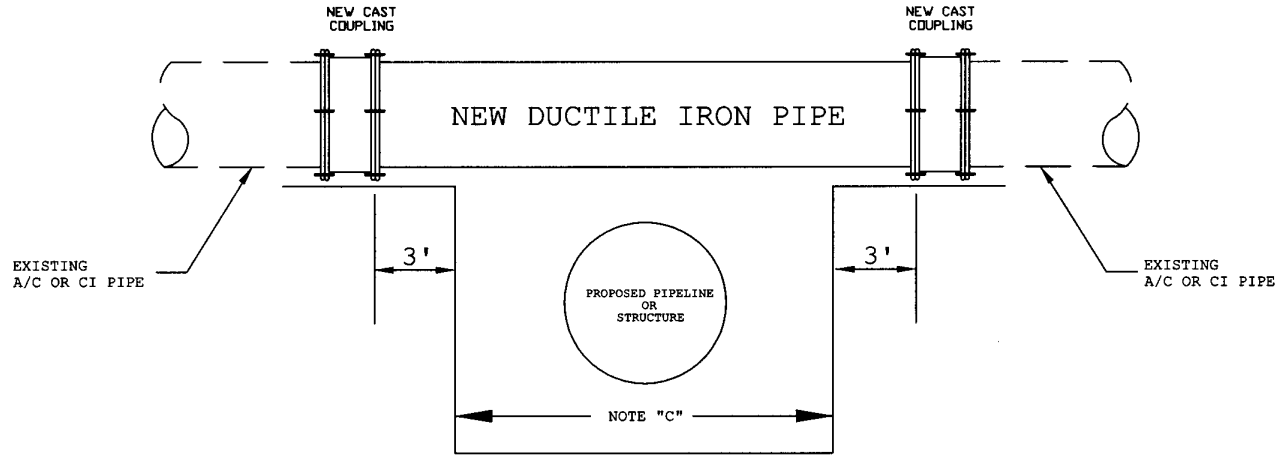
NOTES:

(A) WATERLINE PIPE AT CREEK CROSSINGS, RIVERS, SWALES, ETC. SHALL BE DUCTILE IRON (CLASS 51 OR HIGHER). IF WATERLINE IS OFFSET AROUND CREEK CULVERTS, ENTIRE RUN OF OFFSET SHALL BE DUCTILE IRON. ALL FITTINGS SHALL BE INSTALLED WITH AN APPROVED MECHANICAL JOINT RESTRAINT SYSTEM.

(B) NO JOINTS ARE TO BE INSTALLED UNDER THE CREEK, WHERE POSSIBLE.

DATE	TYPICAL WATERLINE CREEK CROSSINGS	DRWG. NO.
JAN. 1996		WAT-12
REVISIONS NOV. 1999		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



NOTE: WHEN CONNECTING TO A/C WATERLINE, THE MACHINED END OF THE NEW PIPE MUST BE REMOVED PRIOR TO INSTALLATION OF THE CAST COUPLINGS.

A. WHEN CROSSING UNDER AN EXISTING CEMENT ASBESTOS (A/C) OR CAST IRON (CI) WATERMAIN WITH A NEW PIPELINE OR STRUCTURE. WHERE SUCH CROSSING MAY RESULT IN A STRESS FAILURE TO THE EXISTING LINE, THE EXISTING LINE SHALL BE REPLACED WITH A SECTION OF DUCTILE IRON PIPE PRIOR TO CONSTRUCTION OF THE PROPOSED PIPELINE OR STRUCTURE.

B. WHENEVER A PROPOSED PIPELINE CROSSES UNDER AN EXISTING WATER MAIN, THE NEW TRENCH SHALL BE BACKFILLED COMPLETELY WITH CRUSHED STONE AND COMPACTED AS REQUIRED.

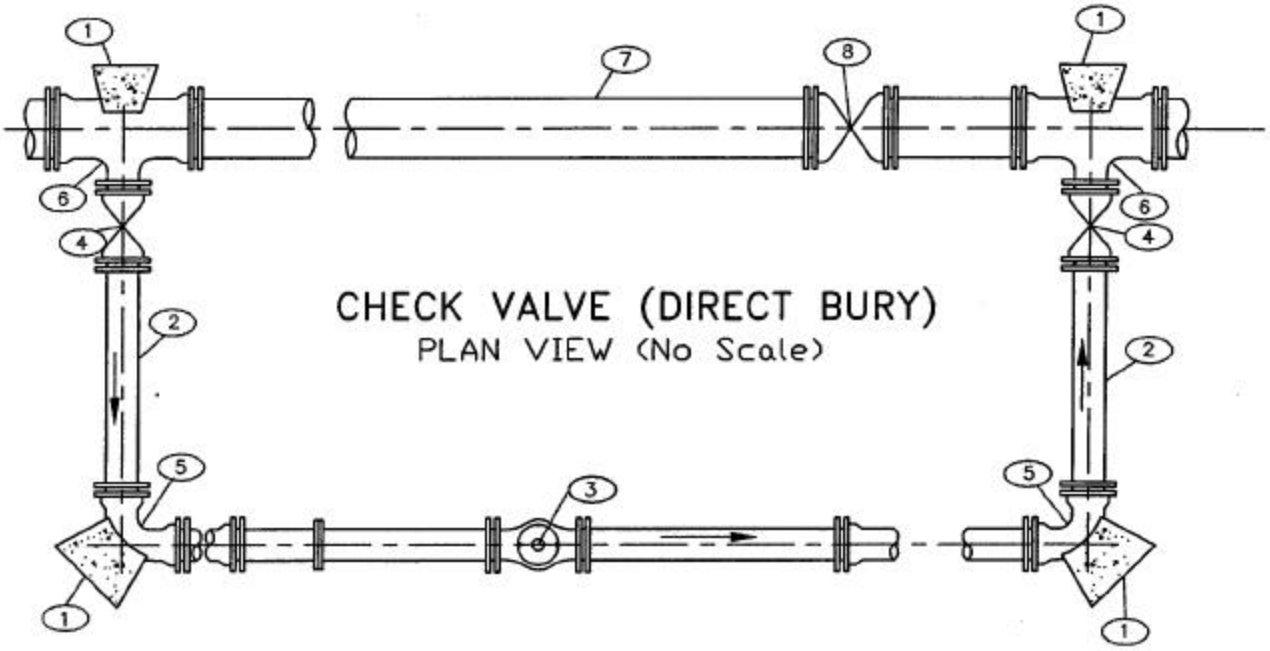
C. REPLACEMENT GUIDELINES BASED UPON TRENCH WIDTH CRITERIA:
CONTRACTOR SHALL USE EXTREME CAUTION WHEN CROSSING EXISTING WATER LINES. WHERE CROSSINGS CAN NOT BE ACCOMPLISHED WITHOUT EXCEEDING TRENCH WIDTHS AS SPECIFIED BELOW, CONTRACTOR, AT HIS EXPENSE, SHALL REPLACE THE EXISTING A/C OR CI WATER LINE AS DEPICTED BELOW.

1. REPLACE EXISTING 4" - 6" A/C OR CI PIPE WHERE WIDTH OF NEW TRENCH CROSSING IS >2 FEET.
2. REPLACE EXISTING 8" A/C OR CI PIPE WHERE WIDTH OF NEW TRENCH CROSSING IS >4 FEET.
3. REPLACE EXISTING 10" - 16" A/C OR CI PIPE WHERE WIDTH OF NEW TRENCH CROSSING IS >6 FEET.

D. PIPELINE TO BE REPLACED SHALL EXTEND A MINIMUM OF 3 FEET BEYOND THE EDGES OF THE NEW TRENCH OR TO SUCH A POINT AS TO PROVIDE A MINIMUM OF 3 FEET OF UNDISTURED EARTH BENEATH THE EXISTING PIPELINE.

DATE	**TYPICAL REPLACEMENT DETAIL**	DRWG. NO.
JUNE 2000	**WHEN CROSSING EXISTING A/C OR CI PIPE**	**WAT-13**
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



CHECK VALVE (DIRECT BURY)
PLAN VIEW (No Scale)

CHECK VALVE MATERIALS KEY

1. CONCRETE THRUST BLOCK (SEE BLK-1, BLK-2)
2. CLASS 52 D.I. PIPE
3. SWING CHECK VALVE (MJxMJ)
4. RESILIENT SEAT VALVE (BUTTERFLY VALVE- 16" & OVER) AND BOX (MJxMJ)
5. 90° BEND (MJxMJ)
6. ANCHORING TEE (MJxMJxA)
7. CLASS 52 D.I. PIPE
8. RESILIENT SEAT VALVE (BUTTERFLY VALVE- 16" & OVER) AND BOX (MJxMJ)

NOTES

(A.) PROVIDE APPROVED RETAINER GLANDS ON ALL M.J. FITTINGS AND VALVES ALL PIPE AND FITTINGS FROM MAINLINE TEE TO CHECK VALVE TO MAINLINE TEE TO BE RESTRAINED.

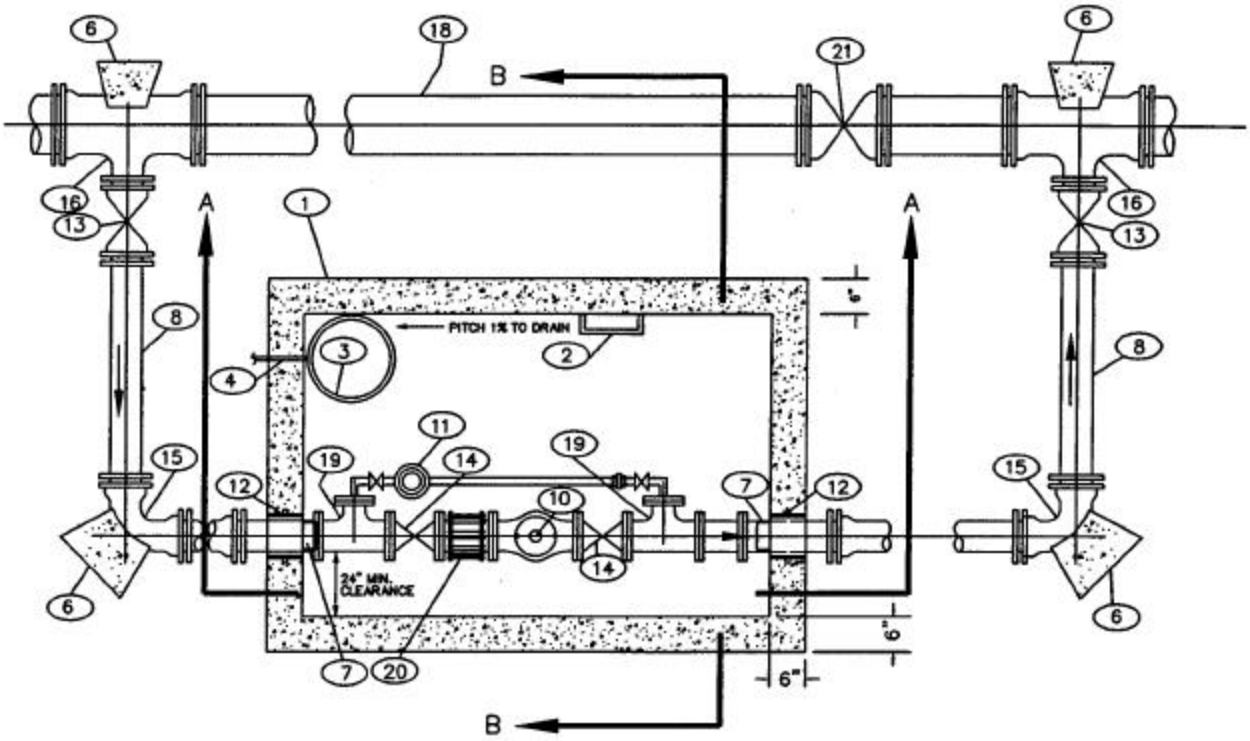
(B.) ALL FITTINGS SHALL BE ASA A21.10 (AWWA C110)

(C.) ALL GATE VALVES SHALL BE NON-RISING STEM

(D.) MJ = MECHANICAL JOINT, A = ANCHOR BOLT

DATE: JUNE 2000 REVISIONS: MARCH 2001	CHECK VALVE (DIRECT BURY)	DRWG. NO. WAT-14

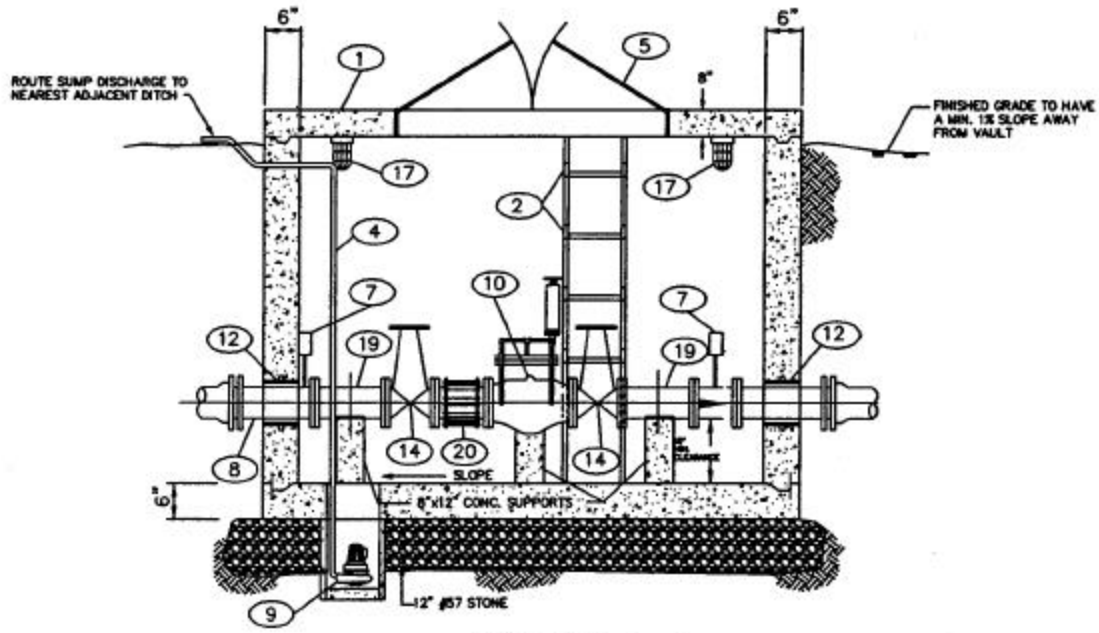
CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES



PRESSURE REDUCING VALVE AND VAULT

PLAN VIEW

NOT TO SCALE



SECTION A–A

NOT TO SCALE

DATE: JUNE 2000	PRESSURE REDUCING VALVE AND VAULT	DRWG. NO. WAT-15
REVISIONS: MARCH 2001		SHT. 1 of 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTES

(a.) SLOPE INSIDE BOTTOM OF VAULT 1% TO SUMP

(b.) PROVIDE APPROVED RETAINER GLANDS ON ALL M.J. FITTINGS AND VALVES. BE RESTRAINED. ALL PIPE AND FITTINGS FROM MAINLINE TEE TO VAULT TO

(c.) CONTRACTOR SHALL SUBMIT PIPING SHOP DRAWINGS PRIOR TO FABRICATION OF PIPE OR POURING OF VAULT.

(d.) ALL FITTINGS SHALL BE ASA A21.10 (AWWA C110)

(e.) ALL RESILIENT SEAT VALVES SHALL BE NON-RISING STEM

(f.) PROVIDE CONC. PIPE SUPPORTS AS REQ'D BY MATERIAL & EQUIPMENT MFG. REQUIREMENT'S.

(g.) MJ= MECHANICAL JOINT, F= FLANGED, A= ANCHOR BOLT

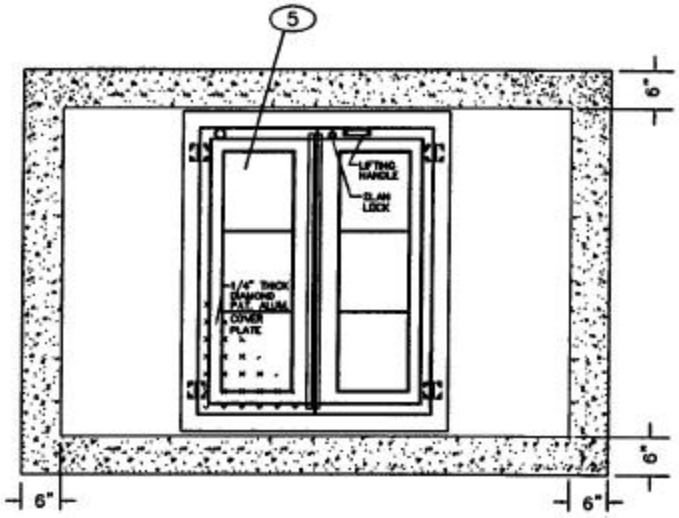
(h.) CONTRACTOR SHALL COORDINATE WITH LOCAL POWER SUPPLIER FOR EXTENSION OF THE PROPER POWER SUPPLY TO THE VALVE VAULT. ELECTRICAL CABLES IN VAULT SHALL BE IN PVC CONDUIT AND COMPLY WITH APPLICABLE ELECTRICAL CODES.

(i.) ALL PIPING IN THE VALVE VAULT SHALL BE PRIMED AND PAINTED WITH AN EPOXY COATING. THE COLOR SHALL BE SAFETY BLUE.

(j.) PRV'S NOT REQUIRING BYPASS VALVE SHALL BE CENTERED HORIZONTALLY IN VAULT.

(k.) PRV'S GREATER THAN 12" DIAMETER – DESIGNED TO BE COORDINATED WITH UTILITIES O & M TECH SUPPORT.

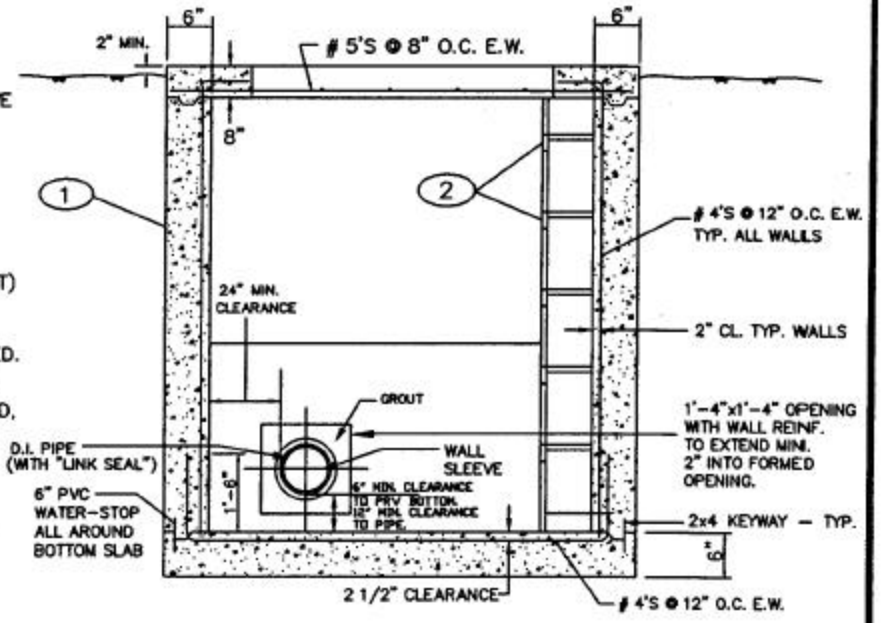
(l.) VAULTS ARE TO BE LOCATED IN AREAS NOT SUBJECT TO VEHICLE TRAFFIC LOADING – PRV'S WHERE IT IS NECESSARY TO SUBJECT THE VAULT TO VEHICLE TRAFFIC SHALL BE COORDINATED WITH UTILITIES O & M TECHNICAL SUPPORT.



TOP VIEW
NOT TO SCALE

P.R.V. & VAULT MATERIALS KEY

1. CONCRETE VAULT SEALED WITH WATER SEALANT (CLEAR FLO # 613 OR EQUAL)
2. ALUMINUM LADDER BOLTED TO VAULT WALL AND FLOOR. SAFETY EXTENSION TO BE PROVIDED WITH LADDER (HALLIDAY L1D LADDER AND L1E EXTENSION OR APPROVED EQUAL).
3. DRAINAGE SUMP
4. 2" SCHEDULE 80 P.V.C. DRAIN LINE W/CHECK VALVE
5. ALUMINUM ACCESS DOOR – HALLIDAY W2C4848 OR APPROVED EQUAL.
6. CONCRETE THRUST BLOCK (SEE BLK-1, BLK-2)
7. 4" PRESSURE GUAGE WITH 3/4" TAPS
8. CLASS 52 D.I. PIPE
9. SUMP PUMP – HYDROMATIC (1/3Hp, 1 1/4" OUTLET) OSP33AB OR APPROVED EQUAL.
10. PRESSURE REDUCING VALVE (PRV) GOLDEN-ANDERSON OR APPROVED EQUAL, FLANGED.
11. BYPASS PIPE W/PRESSURE REDUCING VALVE (PRV) GOLDEN-ANDERSON OR APPROVED EQUAL, FLANGED, WITH TWO GATE VALVES (HANDWHEEL TYPE)
12. WALL SLEEVE – (WITH LINK SEAL)
13. RESILIENT SEAT VALVE WITH BOX (MJxMJ)
14. RESILIENT SEAT VALVE (FxF) (HANDWHEEL TYPE) .
15. 90° BEND (MJxMJ)
16. ANCHORING TEE (MJxMJxA)
17. LIGHT (EXPLOSION PROOF)
18. CLASS 52 D.I. PIPE
19. TEE (FxFxF)
20. SLEEVE COUPLING
21. RESILIENT SEAT VALVE (BUTTERFLY VALVE-16" & OVER) AND BOX (MJxMJ).



SECTION B-B
NOT TO SCALE

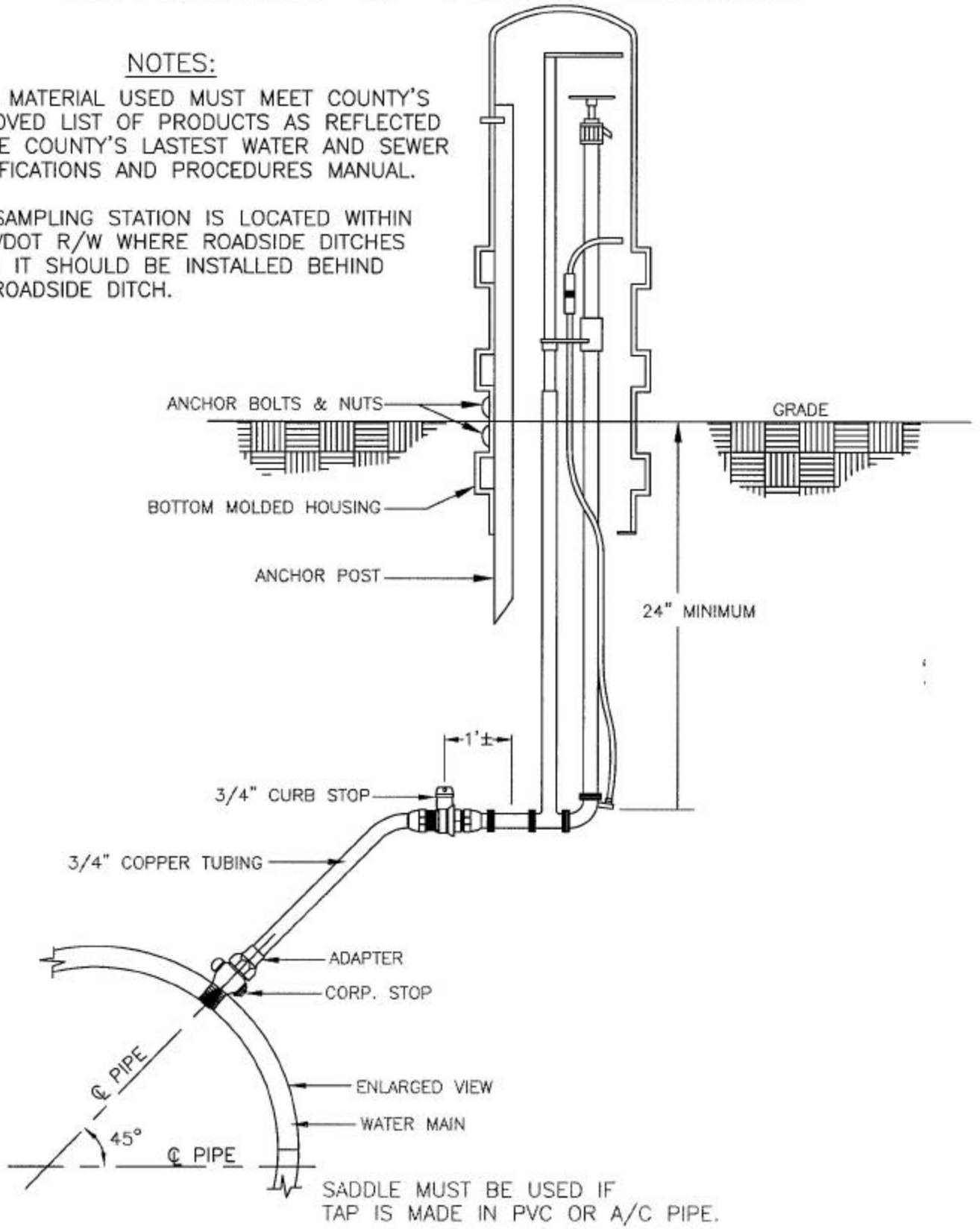
DATE: JUNE 2000 REVISIONS: MARCH 2001	**PRESSURE REDUCING VALVE AND VAULT**	DRWG. NO. **WAT-15** SHT. 2 of 2

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTES:

ALL MATERIAL USED MUST MEET COUNTY'S APPROVED LIST OF PRODUCTS AS REFLECTED IN THE COUNTY'S LASTEST WATER AND SEWER SPECIFICATIONS AND PROCEDURES MANUAL.

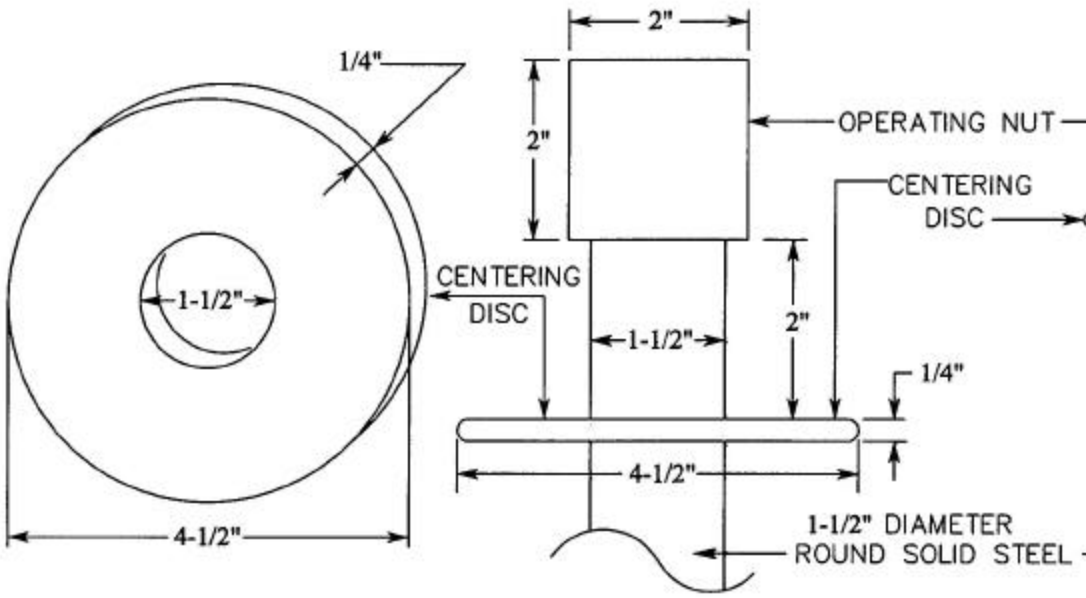
IF SAMPLING STATION IS LOCATED WITHIN THE VDOT R/W WHERE ROADSIDE DITCHES EXIST, IT SHOULD BE INSTALLED BEHIND THE ROADSIDE DITCH.



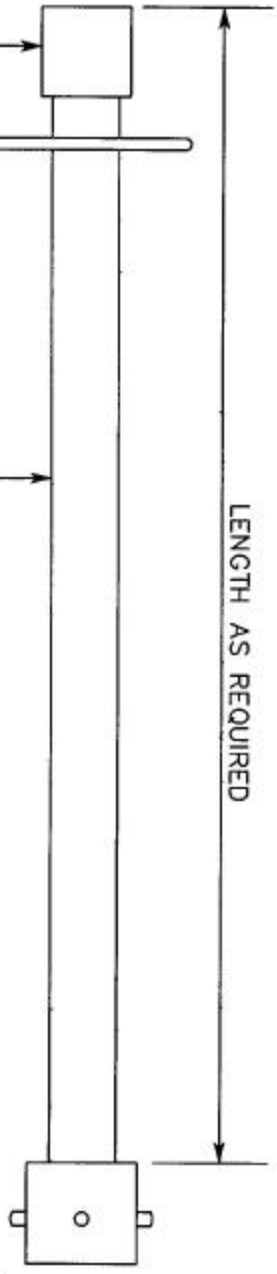
DATE: Sept. 2001	TAPPING DETAIL FOR SAMPLING STATIONS	DRWG. NO. WAT-16
REVISIONS: March 2002		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

BLOW UP VIEW A

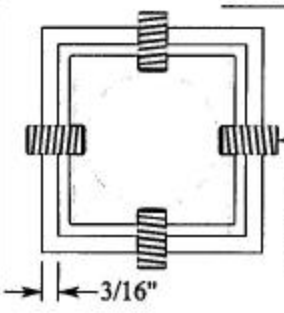


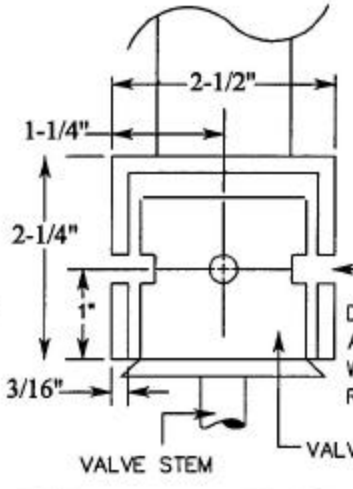
VIEW A



1. Use this detail when distance from top of operating nut of valve to finish grade exceeds 4'–0".
2. All steel, welded valve extensions shall be coated with oil based enamel or other rust–preventive coating.
3. Specified length will be total length of adjustment, measured as shown.
4. The 2" square operating nut on top shall be welded to form a complete box with no openings.
5. 2–1/2" square socket on bottom shall be tapped on 4 sides for minimum 5/16"N.C. socket head set screws and screws shall be provided.
6. Center extension bar shall be 1–1/2" diameter round solid steel.
7. A 4–1/2" diameter x 1/4" steel centering disc shall be welded to the 1–1/2" steel rod, positioned 2" below the 2" square operating nut as shown.

SOCKET SECTION BLOW UP VIEW B



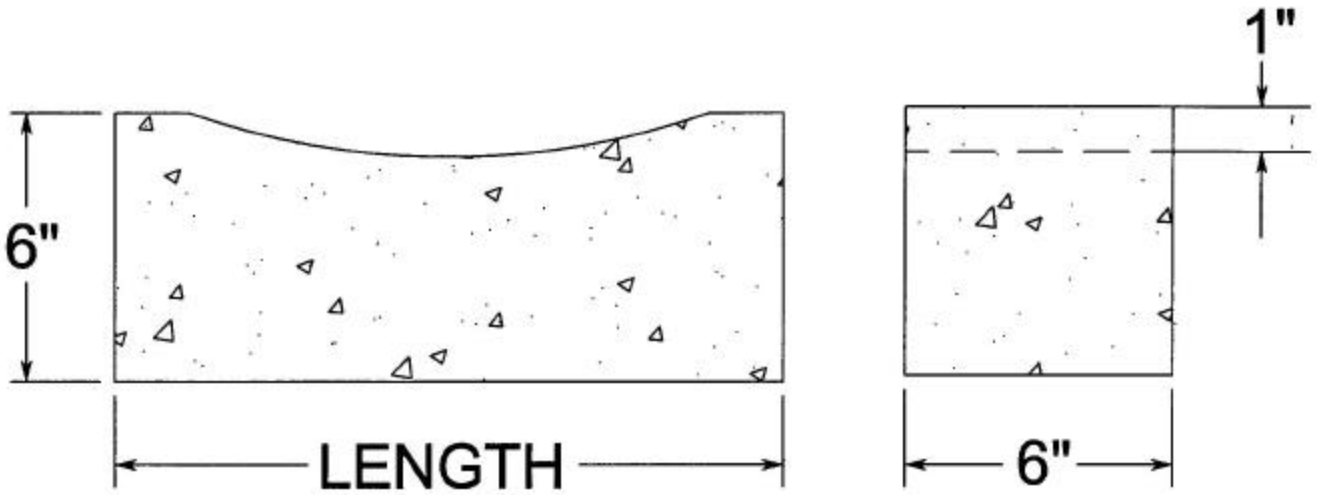


VIEW B

DATE		DRWG. NO.
JAN. 2003	VALVE KEY EXTENSION	WAT–17
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

SIZE OF VALVE	LENGTH	VOLUME CU-FT
16"	30"	0.63
20"	36"	0.75
24"	42"	0.88
30"	48"	1.00
36"	54"	1.13



DATE JAN. 2003	CONCRETE PEDESTAL SUPPORT	DRWG. NO. WAT-18
REVISIONS		